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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII CLEVELAND, OHIO, JUNE 23, 1904 NUMBER 25

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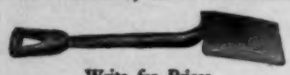
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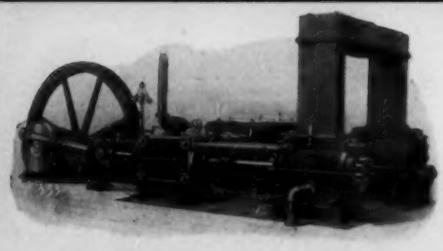
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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, JUNE 23, 1904 NUMBER 25

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Curtailment of production of pig iron and steel is well under way and in the past week has proceeded on a scale suggesting a pronounced lessening of consumption. In the Central West 23 blast furnaces of steel companies are now idle and 7 merchant furnaces. This number will be further increased by July 1. Steel works shutdowns already include the Shoenberger Bessemer plant, the Shenango Valley works at New Castle, the Mingo Junction works, the Newburg, O., Bessemer mills, and two-thirds of the open-hearth furnaces at Sharon. An independent Wheeling steel works will close down within a few days and the La Belle Iron Works at Steubenville by July 1. It remains to be seen whether the stopping on June 30 of sheet and tin plate mills and the portion of bar mills affected by the wage disagreements, will result in a further cutting off of steel capacity. But all indications now point to a quiet summer; the surprise is, in view of the conditions of the past two months, that the cutting off of steel production should thus early be so pronounced.

The question of a revision of prices of steel products has come up, in view of the known decline in ore and pig iron, and the cutting of agreed prices on steel billets. It is conceded that the recent falling off in consumption of steel with the indications that this will go farther, puts a greater strain upon all association arrangements. But there is little inclination on the part of the leading manufacturers of steel to change their schedules. They present an open market as the alternative to maintaining present agreements, arguing that to take a few dollars per ton from the prices generally maintained for the past six months would not lead to improvement in demand; that other causes have much to do, and price very little, with the halting attitude of consumers. The prospect of an open market is naturally not relished by lesser producers who are parties to agreements, and any such suggestion is apt to insure their continued support to present schedules. In spite of the cutting in billets and the minor evasions on certain pool-governed products, there is little prospect of a general revision under present conditions.

What activity appears in pig iron is chiefly due to inquiries from a few large producers, who take account of the possibilities of a change from extreme depression in the iron trade, under the rigid curtailment compelled by low prices. In the Pittsburg district purchases of 9,000 tons, chiefly by one important interest, are reported. Northern No. 2 sold at $12.75, gray forge at $12.15 to $12.25 and Southern No. 2 at $9 Birmingham. A portion of the requirements of an Ohio pipe interest have been covered, and more is pending. The large harvester machinery contract. for about 30,000 tons, previously referred to, has not been closed. Chicago reports a number of inquiries involving 500 to 5,000 ton lots. In the East as low as $8.75 Birmingham for No. 2 iron is reported on one sale. Northern irons are generally from 25 to 50 cents lower in the week, though the business done has not been sufficient to indicate what furnaces would do on a round lot. At New York a sale of 1,000 tons for export was made and in a moderate way export business may be increased.

Changes in finished products are toward lighter demand and lower prices. On bar iron some cutting is reported in the Chicago district, as well as on one Pittsburg district contract, though Eastern manufacturers reaffirmed prices. The wire industry is slacking up very perceptibly. Sheets have made a new low record, and 2.10c for No. 28 has been done on carload business. An Eastern mill has taken an order for 40 miles of 10-inch wrought pipe. Structural business continues disappointing. In spite of contrary reports indications are that no change in the price of rails will be made for some time; the question of the 1905 basis, it is felt, does not call for a definite declaration as yet.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, June 22.

The production of iron and steel is now being heavily curtailed, the number of steel works and blast furnaces that have been shut down thus far this month being far greater than anticipated. This week the Carnegie Steel Co. shut down its Bessemer plant at New Castle, while only four of the 12 open-hearth furnaces at Sharon are in operation. The Shoenberger Bessemer plant of the American Steel & Wire Co. was also closed down this week for an indefinite period and the two furnaces banked, while the wire and nail mills at South Sharon are also idle. At the present time the steel corporation has Bessemer plants idle at Mingo Junction, Columbus, Cleveland and at the Shoenberger plant at Pittsburg. The open-hearth plant at Sharon remains idle, while the plant at South Sharon is only on one-third capacity. One large independent producer in the Ohio Valley intends shutting down his Bessemer plant on Saturday night, while the ten open-hearth furnaces of the LaBelle Iron Works will go out temporarily on July 1. The Duquesne, Edgar Thomson and Homestead works of the Carnegie Steel Co. will probably operate through the summer, but the closing down of the sheet and tin plate mills on July 1 will probably mean the idleness of the Ohio Bessemer plant at Youngstown. In addition the corporation has its Donora plant idle, this never having been operated. Of the 34 furnaces in the Mahoning and Shenango valleys only 18 are active, and five more are preparing to go out, which will reduce the active list to 13 by July 1, or an idle capacity of over 60 percent, the curtailment being much in excess of that anticipated several weeks ago. Of these idle stacks seven are operated by merchant interests, two by the Republic Iron & Steel Co. and seven by the Carnegie Steel Co., two of the idle furnaces being new and never having been operated, while of the others two are under reconstruction. With the Shoenberger furnaces, which were banked this week, and No. 3 at Youngstown, which was banked several days ago, the steel corporation has 18 idle stacks in the Pittsburg, Valley and Southern Ohio districts.

Despite the curtailment, due to the falling off in demand, and in the face of the reductions in pig iron prices, putting ruling prices for heavy steel out of proportion with the cost of iron and the selling prices of finished material, some of the leading manufacturers are opposed to any reduction in the

billet schedule at the next meeting of the association. They argue that it would not stimulate demand to make a reduction and that consumers would wait for still further reductions. The price is either to be maintained or an open market to be declared, few manufacturers being in favor of any half-way course. In spite of the determination to hold prices, the market is being cut by a large number of producers, and for delivery after July 1 the quotations of mills not controlled by this agreement is $20 for open-hearth and $21 for Bessemer. If the billet schedule is reaffirmed no readjustment of finished lines can be expected, while on rails there is a determination to reaffirm the present schedule and not touch next year's prices. As rail prices are guaranteed, any reduction would mean a rebate on every standard section rolled this year, and little new business is in sight, in any event.

An order for 9,000 tons of foundry and forge iron for delivery the third quarter is by far the largest placed in this district for some time. On Southern foundry $9 Birmingham was not shaded, while on Southern forge $8 was done. Low prices were made on Northern forge, according to report $12.25 was shaded on one lot, while one Valley furnace is said to have quoted $12.15 on another order. The Pressed Steel Car Co. this week purchased 1,500 tons of bar iron, some of it at a flat price of 1.25c, Pittsburg. On sheets extremely low prices are reported, 2.10c having been done on No. 28 gauge in carload lots.

The conference on the iron scale held with the Carnegie Steel Co. by the Amalgamated Association last Friday and Saturday resulted in no agreement, and no date was set for holding a future conference on the sheet and tin plate scales opened in the offices of the American Sheet & Tin Plate Co. in this city yesterday, and promises to be protracted. The shutting down of the Shenango Bessemer plant indicates that a complete shut down of the tin plate mills is anticipated on July 1. The Republic Iron & Steel Co. has made an arrangement with the association by which its mills will not be closed on July 1 in case of a disagreement, the entire matter to be left to a board of arbitration.

Coke production is also curtailed, no less than 2,000 ovens having gone out in the past week in the Connellsville region, while prices continue to seek a lower level. Good grades of Connellsville foundry coke are offered at prices ranging from $1.75 to $1.90, and in a few instances $1.65 has been done, while on furnace coke $1.40 to $1.45 is the ruling quotation for the second half.

Pig Iron.—Despite the declining market, one large local consumer this week closed for a trifle over 9,000 tons of foundry and forge iron for delivery the third quarter. About half went to Southern furnaces and the remainder went to Northern and Virginia stacks. On the Southern foundry iron $9 Birmingham was done and $8 on the forge iron. On the Northern foundry a little better than $12.75 Pittsburg was done on No. 2, while on forge iron it is reported that $12.25 Pittsburg was shaded. Several small lots of No. 2 foundry have been reported sold at prices ranging from $12.75 to $13 Pittsburg, although as low as $12.60 has been reported. The drop in forge iron is the surprise of the week, as low as $12.15 Pittsburg having been reported. On Bessemer iron $12 at the furnace seems to be the nominal price, but this could be shaded on a desirable order. On basic the same price is quoted, although as low as $11.75 at the furnace has been quoted. During the week the Carnegie Steel Co. banked its No. 3 stack at Youngstown, and the Cherry Valley Iron Co. blew out its stack at Leetonia for repairs and blew in its furnace at West Middlesex, which has been out for more than six months, being practically rebuilt. At Pittsburg the two furnaces of the Shoenberger plant were banked. Of the Valley furnaces there are only 18 active out of a total of 34, although in this list of stacks there are two new ones that have never been operated, owned by the Carnegie Steel Co. at Youngstown and Sharon, respectively, making actually only 14 stacks idle due to the present depression. Of the idle furnaces 7 are owned by merchant operators, two by the Republic Iron & Steel Co., and the remainder by the Carnegie Steel Co. In the Pittsburg district the Carnegie Steel Co. and the American Steel & Wire Co. have five stacks idle, with three new stacks available which have never been operated, making a total of eight. In addition there are three stacks idle at Mingo Junction and, with the seven in the Valleys, there is a total of 18 idle steel corporation stacks in the Pittsburg, Southeastern Ohio and Valley districts. In the Valleys five merchant furnaces are preparing to go out and one in Western Pennsylvania expects to be out by the end of the month. The Valley furnaces that are preparing to go out are McKeefrey & Co., Leetonia; Brier Hill Iron & Coal Co., Youngstown; Ohio Iron & Steel, Lowellville; Stewart, Sharpsville. This will leave only 13 active furnaces in the Valleys on July 1 out of a total of 34, or an idle capacity of over 60 percent. The curtailment of production is at a far greater rate than was anticipated at the beginning of this month, and further steel corporation stacks in the Valleys are expected to go out during July, if the anticipated shut down of the sheet and tin plate mills occurs. We revise quotations as follows:

Bessemer, Valley	$12 00
Bessemer, Pittsburg	12 85
No. 1 Foundry	13 00 to 13 25
No. 2 Foundry	12 65 to 12 75
Gray forge, Pittsburg	12 15 to 12 40
Chilled basic, Valley	11 90 to 12 00
Chilled basic, Pittsburg	11 75 to 12 85

Steel.—The steel production is being greatly curtailed, the Shoenberger and Shenango Valley Bessemer plants of the steel corporation having been shut down this week. At South Sharon only four out of a total of 12 open-hearth furnaces are in operation, while the North Sharon open-hearth plant continues idle. In addition the corporation has Bessemer plants idle at Mingo Junction, Cleveland and Columbus, O. One Ohio Valley Bessemer plant, independent, expects to go down on Saturday night, while the LaBelle Iron Works, Steubenville, O., will shut down on July 1. On the other hand, there is no likelihood of the steel producing capacity of the Duquesne, Edgar Thomson and Homestead plants of the Carnegie Steel Co. being curtailed during the summer to any great extent. Duquesne is operating full on foreign orders, and Edgar Thomson is again on rails, while the temporary increase in the demand for plates on the part of the steel car manufacturers insures a steady run for Homestead. Should the sheet and tin plate mills be shut down on July 1 it is probable that the Ohio works at Youngstown will be off temporarily. The Bessemer plant of the Republic Iron & Steel Co., Youngstown, which was idle last week, is again in operation, but will probably be off again next week. There is little demand for steel, and what tonnage is being placed is below agreed prices. On the other hand, manufacturers are at present opposed to any reduction in price at the meeting to be held in July, fearing that an entire readjustment of the finished material market would be necessary. On open-hearth billets for delivery after July 1, $20 Pittsburg is being quoted and $21 could be done on Bessemer. Agreed prices are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheets and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30 to $31 Pittsburg.

Ferro-Manganese.—Domestic ferro, 80 percent, is held at $41.50 to $42, delivered at buyer's mill at any point east of the Mississippi.

Spelter.—The market is quiet, prime western grades being held at 4.70c to 4.73c Pittsburg, in carload lots.

Skelp.—Sheared iron skelp is quoted at 1.52½c, Pittsburg, and grooved at 1.47c. Sheared and grooved steel skelp is quoted at 1.35c to 1.40c.

Muck Bar.—The market is quiet, all pig market being held nominally at $25, and lower grades at $24 to $24.50.

Rails and Track Material.—The market continues quiet and little new business is being placed. On light sections as low as $20 has been reported for 25-pound rails. We revise quotations as follows: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 to 25 pounds, $22.50 to $23.50; 25 to 40 pounds, $20 to $21.50. Track material: Spikes, 1.65c to 1.70c.

Plates.—Local mills are busy filling orders for the steel car interests, while the demand from structural fitters is better than it has been for some time. We make the following quotations: Tank plates, ¼ inch thick and up to 100 inches in

width, 1.60c at mill Pittsburg; flange and boiler steel, 1.70c marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates, more than 10 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

Bars.—The Pressed Steel Car Co. this week placed an order for 1,500 tons of iron bars, portions of the tonnage having been taken at 1.25c flat, Pittsburg. The demand for steel bars is by no means large, and specifications on existing contracts continue light. We make the following quotations: Bar iron, 1.25c to 1.30c Pittsburg for local delivery, while for Western shipments quotations are based on 1.25c to 1.35c Pittsburg. Hoops are held at 1.55c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open-hearth, 1.40c; plow beams and cultivator beams, 1.35c net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size, not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Sheets.—A large number of the sheet mills of the American Sheet & Tin Plate Co. are idle, while a number of the independent plants are also off. On July 1 a practical shutdown of the entire sheet industry of the country is looked for. Low prices are also being named, 2.10c now being done by some mills on 28 gauge. We make the following quotations: Black sheets, No. 8, 1.60c to 1.65c; No. 9, 1.65c to 1.70c; Nos. 12-14, 1.70c to 1.75c; Nos. 15-17, 1.80c to 1.85c; Nos. 18-21, 1.90c to 1.95c; Nos. 22-24, 1.95c to 2c; Nos. 25-26, 2c to 2.05c; No. 27, 2.05c to 2.10c; No. 28, 2.15c to 2.20c; No. 29, 2.45c to 2.50c; No. 30, 2.55c to 2.60c. Galvanized: Nos. 12-17, 2.25c to 2.30c; Nos. 18-21, 2.40c to 2.45c; Nos. 22-24, 2.55c to 2.60c; Nos. 25-26, 2.75c to 2.80c; No. 27, 2.95c to 3c; No. 28, 3.15c to 3.20c; No. 29, 3.50c to 3.60c; No. 30, 3.90c to 4c.

Wire and Wire Nails.—The wire and nail mills of the American Steel & Wire Co. at South Sharon were shut down this week, while the Shoenberger and Newburg Bessemer steel plants of that company are also idle. This would indicate considerable falling off in consumption as compared with the demand earlier in the year. Prices continue to be shaded from $1 to $2 a ton. Agreed quotations are as follows: Wire nails, carload lots to jobbers f. o. b. cars Pittsburg, are quoted $1.90 base; plain wire, carload lots, $1.80 base; barb wire, carload lots, $2.20 base; staples, carload lots, $2.05 keg. Galvanized 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.75, and less than carload lots, $1.80 f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days less 2 percent off in 10 days.

Merchant Steel.—A meeting of the shafting manufacturers was held in Cleveland last Wednesday and ruling discounts were reaffirmed. The market generally continues quiet. We make the following quotations: Toe calk, 1.90c; carriage spring steel, 1.75c; tire steel, 1.55c to 1.60c; plow steel, 6 inches and under, 1.35c for Bessemer and open-hearth; plow slabs, ¾ inch and heavier, 1.60c. The demand for shafting on the part of the machinery manufacturers is not heavy, and tonnage has therefore been considerably affected. Drawn and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carload lots.

Structural Material.—The Wabash Railroad Co. has not yet closed for its elevated tracks on the South Side, although the contract is expected to be placed this week. The Pennsylvania railroad will open bids this week for its Duquesne Way elevated road, requiring about 5,000 tons of steel. We make the following quotations: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Pipes and Tubes.—The Philadelphia Co. has placed another contract for 40 miles of 10-inch iron pipe, the order going to an Eastern mill. There is considerable cutting on merchant pipe and demand is not heavy. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are revised as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch	69	59	66	56
½ inch	72	62	69	59
¾ to 6 inch	76	66	73	63
7 to 12 inch	71	61	68	58
Ex. stg., plain ends, ⅛ to 8 in.	68	58	64	54
Double ex. stg., pl. ends, ⅛ to 8 in.	60	50	56	46

BOILER TUBES.

	Steel.	Iron.
1 to 1½ inch	42½	39
1¾ to 2¼ inch	55½	38
2½ inch	58	43
2¾ to 5 inch	64½	50½
6 to 18 inch	58½	38

Old Material.—The market continues quiet and quotations are merely nominal as follows, gross tons: Old steel rails, $11.25 to $11.50; old car wheels, $11.75 to $12; iron axles, $14.75 to $15; heavy melting scrap, $11 to $11.50; low phosphorus melting scrap, $14.75 to $15; sheet scrap, $7 to $7.25; No. 1 wrought and No. 1 railroad scrap, $11.75 to $12, net tons; cast scrap, $9.

Coke.—Strictly Connellsville foundry coke is now selling at prices ranging from $1.75 to $1.90 and as low as $1.65 has been done in extreme cases. On furnace coke for the last half $1.40 to $1.45 is quoted on strictly Connellsville product. Coke production is being heavily curtailed, and with the shutting down of furnaces a further curtailment is looked for. During the week ending Saturday, June 11, the production of the upper region is estimated at 193,247 tons and the lower region 54,094 tons. The output during that week was reduced fully 10,000 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, June 21.

It requires very little of a buying movement these days to raise the hopes of sellers of iron and steel products, which is expressive of the peculiar state of the local market. But a puff does not make a trade wind and usually a greater calm has followed each rise in the barometer of sentiment after the flurry has spent itself. This accounts for the almost weekly change in the tenor of this report. Last week we noted an improvement in the demand for finished products, and a corresponding dullness in raw materials; this week the conditions are reversed. But despite the slight improvement in the demand for pig iron, the market generally speaking remains a sluggish one. There are some hopeful features to it, however, and not the least is the firm attitude producers have shown in the maintenance of prices. The leading Southern furnace interests are still holding out for $9.25 and $9.50 Birmingham for No. 2, and although plenty of iron can be obtained at $9, the refusal of the big producers to meet this competition has prevented the market from sagging below the latter level. Likewise, the general maintenance of agreed prices on billets, structural steel, plates and other heavy materials has been no small factor in the prevention of demoralization in those products. It is true that at different times these schedules have been menaced, but there is no disposition shown by local parties to the various agreements to consider a change at the present time. The sheet mills are well filled with business and the local market is more active than for several weeks. Reports are frequently heard that the new prices are being shaded, and it is doubtless true that they can be, but when traced down the reports are generally found to have grown out of the fact that the mill made the concession because it happened to be rolling the particular sizes wanted and could give immediate delivery on the specifications. Prices of bar iron and steel are firm, although little new business is being booked. Some tonnage in merchant steel was taken during the week by implement interests, the contracts covering requirements up to July, 1905. A seasonable dullness is prevailing in wire products, and aside from continued good specifications for renewing depleted stocks, the market is without interest. Trading in billets, plates and structural steel is of merely a nominal character, the inquiries usually being for small lots. A better demand is felt for merchant pipe, and it is believed that with the passing of the national conventions there will be further improvement.

Coke is stronger, and good 72-hour grades for future deliveries are firm at $2 at the ovens. Spot coke, of which there is a little now on track, can be had at from $3.75 to $4 Chicago. There is some movement in old material, although the speculative feature which has become part of the local situation tends to keep the prices down to a low level.

Pig Iron.—There is plenty of evidence that some buyers, realizing there is little likelihood of the market going below the $9 basis, are now in a mood to cover for their requirements either in part or whole for the next six months. During the past week inquiries have been received for lots ranging from 5,000 tons down to 500 tons, deliveries extending as far as April, 1905; and although little of this has yet been placed, it is indicative of the strong interest which melters are showing in the market. No furnace, however, will consider any orders for deliveries beyond September at the present minimum price, while some of the leading interests are holding out for $9.25 and $9.50 respectively, be the delivery early or late. Southern irons will be 20 cents a ton higher in this market after July 1, the railroads having decided to reinstate the $3.85 freight rate from Birmingham to Chicago on that date. The change comes as a surprise to both the producing and consuming interests, as it was hoped in view of the weak and unsettled state of the market there would be no further tampering with freight schedules between Southern points and this city for some time to come. The present schedule of $3.65 has been in effect since April 25, and was made by a cut of 20 cents a ton in the rate from the Ohio river to Chicago, South Bend, Rockford, Moline and Mississippi river points. Other cities will take their proportionate advance, being 15 cents to Milwaukee and Wisconsin points, and 10 cents to Peoria and Central Illinois points. While this change will help to stiffen prices of Northern irons when it becomes operative, we have to report a very quiet demand upon local stacks. Prices are drooping, No. 2 foundry being quoted at $13.25 Chicago, 25 cents a ton lower than a week ago. There is, however, so little demand for Northern iron that it is difficult to state what price would be acceptable to furnaces on a good round lot. The implement interest, which is said to be figuring on requirements aggregating 35,000 tons, has not yet placed any orders, and is stated to be waiting for lower prices than have been made. We quote as follows:

Lake Superior Charcoal	$14 50 to 15 00
Northern Coke Foundry No. 1	13 75 to 14 00
Northern Coke Foundry No. 2	13 25 to 13 50
Northern Coke Foundry No. 3	13 00 to 13 25
Northern Scotch Foundry No. 1	14 00 to 14 25
Ohio Strong Softeners No. 1	15 30 to 15 80
Ohio Strong Softeners No. 2	14 80 to 15 30
Southern Coke Foundry No. 1	13 15 to 13 40
Southern Coke Foundry No. 2	12 65 to 12 90
Southern Coke Foundry No. 3	12 15 to 12 40
Southern Coke Foundry No. 4	11 90 to 12 15
Southern No. 1 Soft	13 15 to 13 40
Southern No. 2 Soft	12 65 to 12 90
Southern Gray Forge	12 15 to 12 40
Southern Mottled	12 15 to 12 40
Southern Silveries (4% to 6% Silicon)	14 85 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 35
Malleable Bessemer	14 00 to 14 50
Alabama Basic	13 15 to 13 40
Virginia Basic	14 40 to 14 65

Billets.—There has been little demand for billets during the past week. We continue to quote association prices for Bessemer and open-hearth billets, 4x4 and larger, up to .25 carbon, $24; up to and including .60 carbon, $1 extra; over .60 carbon, $2 extra. Billets, 3⅞ inches and smaller, and sheet and tin bars, $25. Open-hearth billets from store, $1.30 per 100 lbs.

Iron and Steel Bars.—New business is light, though specifications keep up in good volume. Reports are current that on desirable business local bar iron producers are shading 1.35c. Hoops are sustaining the recent advance of $3 per ton, and some business has been booked at the new price. Small angles are firmer and prices are rather better maintained. We quote as follows: Bar iron, 1.35c to 1.40c, base, half extras; soft steel bars, 1.51½c, half extras; soft steel angles, less than 3x3, 1.61½c; hoops, 1.71½c. On lots from store, we quote: Iron bars, 1.75c base, full extras; steel bars, 1.70c to 1.80c, base, half extras; hoops, 2c to 2.10c rates, full extras.

Sheets.—Independent mills in the West and Central West are generally well filled with business for the next 60 to 90 days, and except on desirable specifications it is difficult to place an order with them for deliveries prior to that time. The atmosphere of the local market is much clearer, and though reports are current that prices are being shaded, it is generally found on tracing these down that it applies only on a particular size which the mill happens to be rolling. On general business, the market is firm and prices are steady. We quote as follows: For one pass, cold rolled, blue annealed sheets, mill shipments, Chicago delivery, as follows: Nos. 11-12, 1.86½c; Nos. 13-14, 1.91½c; Nos. 15-16, 2.01½c. On box annealed, one pass, cold rolled, Nos. 18-20, 2.11½c; Nos. 22-24, 2.16½c; Nos. 25-26, 2.21½c; No. 27, 2:26½c; No. 28, 2.36½c; No. 29, 2.51½c; No. 30, 2.61½c. Store prices are as follows: No. 8, 2.10c; No. 10, 2.15c; No. 12, 2.20c; No. 14, 2.25c; No. 16, 2.30c; Nos. 18 and 20, 2.40c; No. 22, 2.45c; No. 24, 2.50c; No. 26, 2.60c; No. 27, 2.70c; No. 28, 2.80c; No. 29, 2.95c; No. 30, 3.10c. On galvanized sheets producers are quoting 80 and 2½ to 80 and 5 percent discount at mill, carload lots; while jobbers' prices on the same product are 75 and 10 percent discount.

Structural Steel.—There is little change to be noted in the local market, demand for structural shapes being limited to small lots for storage purposes. Local jobbers say there is a good demand for small sizes for small buildings. We quote association prices, car lots, mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; beams, 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—Fairly good specifications are received by the local mill, and it is now assured of continued operation for several weeks. Demand from warehouse stocks is also improving, although the orders are largely for small sizes. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼-inch and heavier, 1.76½c; flange steel, 1.86½c; marine, 1.96½c; universal mill plate, 1.76½c to 1.81½c; 3-16-inch, 1.86½c; Nos. 7 and 8, 1.91½c; No. 9, 2.01½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel, ¼-inch and heavier, 2c; 3-16, 2.10c; No. 8, 2.15c; No. 10, 2.15c; flange steel, 2.25c, all f. o. b. warehouse.

Rails and Track Supplies.—A number of inquiries have been received from projectors of inter-urban and city railways, although it is questionable if many of them will result in business. Outside of specifications for standard rails from steam roads, the week has been quiet. We quote heavy sections, mill shipments, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails, $23 to $25; track supplies, f. o. b. Joliet mill: angle bars, 1.35c to 1.45c; spikes, first quality, 1.65c to 1.75c; track bolts, 3½ x ¾, with square nuts, 2.20c to 2.30c per 100 lbs.; with hexagon nuts, 2.35c to 2.45c.

Merchant Steel.—Some contracts have been closed during the week with implement manufacturers for their requirements in certain of the following specialties up to July, 1905. Specifications show a seasonable falling off, though mills are well filled with business. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.30c and upward, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½ to 8c; special tool steel, 12c up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Cast Iron Pipe.—Demand is limited to small lots of which quick delivery is asked. There is a marked absence of big inquiries either for railroad or municipal work. Prices are unchanged, and we quote 4-inch water pipe, $26; 6 to 12-inch, $25; larger sizes, $24.50; gas pipe, $1 a ton higher.

Merchant Pipe.—There has been a marked improvement in the city trade, a number of jobbers sending in good-sized specifications for immediate shipment. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago as follows:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ to ⅜ inch	67.35	57.35	64.35	54.35
½ inch	70.35	60.35	67.35	57.35
¾ to 6 inches	74.35	64.35	71.35	61.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ percent advance.
Stove discounts are unchanged, as follows:

Boiler Tubes.—New business is quiet, and independent makers are said to be shading prices. We quote local prices of the leading maker, carload lots, mill shipments, as follows:

BOILER TUBES.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	43.35	40.35	52.35
1¾ to 2¼ inch	55.35	38.35	40.35
2½ inch	58.35	43.35	43.35
2¾ inch to 5 inch	64.35	50.35	Up to 4 inches. 50.35
6 to 12 inch	55.35	38.35	

Wire Products.—The wire trade is experiencing the usual midsummer dullness and the leading producer expects to close some of its mills in July. The manufacturing interests, however, are busy and specifying on their contracts freely. Prices are firm and are being upheld in this market. We quote to jobbers, carload lots, Chicago delivery, as follows: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.91½c base; less than carload lots, 1.96½c; smooth wire, carload, $2, and $2.05 for less than carload lots; galvanized smooth wire, $2.30 in carloads and $2.35 in lesser amounts; painted barb wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barb wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount, f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or De Kalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—The local market shows no change. There is some spot coke on track which is being offered at from $3.75 to $4. For future deliveries, however, both Connellsville and Southern producers are asking $2 at the ovens for standard 72-hour foundry grades, making the Chicago prices $4.65.

Old Material.—A little inquiry has sprung up during the week from large melting interests, which is about the only change to be noted in the local situation. Railroads are still hoarding their scrap for better prices and no lists of consequence have been sent out during the week. The speculative tendency of several dealers tends to keep prices down to a low level, and until there is a more healthy demand it is not expected there will be any material improvement in prices. We quote on gross tons as follows:

Old iron rails	$14 50 to 15 00
Old steel rails (4 feet and over)	11 00 to 11 50
Old steel rails (less than 4 feet)	9 50 to 10 00
Relaying rails, subject to inspection	23 00 to 24 00
Relaying rails for sidetracks	18 00 to 20 00
Old wheels	11 50 to 12 00
Heavy melting steel	9 50 to 10 00
Mixed country steel	7 00 to 7 50

The following quotations are for net tons:

Low phosphorus scrap (.04 and under)	12 00 to 13 00
No. 1 R. R. wrought	10 50 to 11 00
No. 2 R. R. wrought	9 00 to 9 50
Shafting	12 50 to 13 00
Dealers' Forge, No. 1	8 00 to 8 50
Wrought pipe and flues	7 50 to 8 00
No. 1 cast, 150 lb. and less	9 25 to 10 00
Heavy cast	7 75 to 8 25
No. 1 mill	6 00 to 6 50
Country sheet	5 00 to 5 50
No. 1 boilers, cut	7 50 to 8 00
Boiler punchings	9 00 to 9 50
Iron car axles	15 00 to 15 50
Steel car axles	13 50 to 14 00
Iron axle turnings	7 00 to 7 50
Steel axle turnings	7 00 to 7 50
Cast borings	3 00 to 3 50
Mixed borings, etc.	3 00 to 3 50
Wrought turnings	6 00 to 6 50
Machine shop turnings	6 00 to 6 50
Railroad malleable	8 25 to 8 75
Agricultural malleable	7 75 to 8 00
Stove plate and light cast scrap	7 25 to 7 75
Old iron splice bars	12 00 to 12 50

CLEVELAND

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, June 22.

Iron Ore.—Producers and selling agents emphatically deny the report published in Eastern newspapers that Mesabi Bessemer is selling for $2.50. The report may have originated from the fact that ore from a mine which usually produces standard Bessemer was sold at about $2.50, but this particular ore was so high in phosphorus that it could not be classified as Bessemer. Some Mesabi Bessemers are being firmly held at $3.25, but $3 is the usual price and a few new mines have shaded that price to introduce their ores. Standard Mesabi non-Bessemer is selling at $2.25 to $2.65. Old range Bessemer is quoted at $3.25, and there has been little deviation from this price. The selling price of old range non-Bessemer is $2.60 to $2.65 for ores high in phosphorus and $2.75 to $2.80 for those medium in phosphorus. The ore market is very quiet, but many mines will be closed rather than sell below the above prices.

The sudden ending of the strike on the lakes found the shippers unprepared to load ore at upper lake ports and there were more vessels than cargoes. Consequently the unexpectedly low rate of 70 cents from the head of the lakes and 55 cents from Escanaba was accepted on wild tonnage. No season contracts have been made and it is difficult to predict what the freight rate will be. Vessel owners have had several meetings and declare they will not make season contracts at less than 80 cents. If they adhere to this position, the making of such contracts will be indefinitely delayed. It is not expected that the shipments up to July 1 will exceed 700,000 tons.

Pig Iron.—Foundries continue to buy in very small quantities, but often insist on very prompt delivery, their letters and telegrams showing that they have very little iron on hand. In the Valley, the usual price is $12 for No. 2, but it is probable that a good-sized order could be placed at $11.75. In the South, little iron is sold above $9, Birmingham, for No. 2, although some producers decline to accept less than $9.25. We quote prices as follows for Cleveland delivery except Northern gray forge, which is at Valley furnace:

Bessemer	$12 85 to 13 00
No. 1 Strong Foundry	13 00 to 13 25
No. 2 Strong Foundry	12 85 to 13 00
No. 3 Foundry	12 50 to 12 75
No. 2 Southern	12 85 to 13 10
Gray Forge, Valley furnace	11 65 to 11 90
Gray Forge, Southern (Cleveland)	11 85 to 12 00
Lake Superior charcoal	14 25 to 14 50

Finished Material.—The improvement in the demand for structural material is maintained. Specifications against contracts for all sorts of material are coming in freely and this is perhaps the most favorable feature of the market. A considerable tonnage of light rails is being disposed of, but competition continues to be keen. Several traction lines are getting their financial arrangements in better shape and expect to take a large tonnage of standard sections at an early date. Steel bars are selling in moderate quantities at 1.44½c, Cleveland, for Bessemer, and 1.49½c for open hearth. The official quotation for bar iron is 1.44½c, Cleveland, but this is shaded to meet competition. Mills are busy filling orders preparatory to the shut down of July 1, and the outlook is that on that date there will be little stock on hand except in the warehouses of jobbers. There is more demand for sheets and the principal producer is not as much troubled by competitors as it was before revised prices were announced. We quote as follows, Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.74½c; No. 11-12, 1.79½c; No. 14, 1.84½c; No. 16, 1.94½c; No. 27, 2.19½c; No. 28, 2.29½c. Galvanized, mill sales, No. 14, 2.29½c; No. 16, 2.39½c; No. 18-20, 2.54½c; No. 22-24, 2.69½c; No. 25-26, 2.89½c; No. 27, 3.09½c; No. 28, 3.29½c. Out of stock, galvanized sheets, are quoted 75, 10 and 5 off for Nos. 16 to 20, and 75, 10 and 7½ off for No. 22 and lighter gauges. Black sheets

out of stock: ¼ in., 1.90c; 3-16 in., 2c. Blue annealed: No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: Nos. 18-20, 2.35c; Nos. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c.

Old Material.—The business is demoralized and purchases are confined almost entirely to dealers who are buying and storing scrap in their yards. Railroads are offering freely. We quote as follows:

Old iron rails	$14 00 to 15 00
Old steel rails (over 6 feet)	12 00 to 13 00
Old steel rails (under 6 feet)	11 00 to 12 00
Old car wheels	10 00 to 11 00
Steel boiler plate	9 00 to 10 00
Malleable iron (railroad)	9 00 to 10 00
Malleable iron (agricultural)	8 00 to 9 00
Heavy steel	9 00 to 10 00

We quote the following net tons:

No. 1 R. R. wrought	$10 00 to 11 00
No. 1 busheling	8 50 to 9 00
No. 1 machine cast	9 50 to 10 50
Iron axles	15 00 to 16 00
Axle turnings	7 00 to 8 00
Wrought turnings (free from cast)	6 00 to 6 50
Grate bars	7 00 to 8 00
Pipes and flues	8 00 to 8 50
Tank iron	7 50 to 8 50
Hoop and band iron	5 00 to 5 50
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 6 50
Stove plate	7 50 to 8 50
Steel axles	13 00 to 14 00
Cast borings	4 00 to 4 50

CINCINNATI.

June 21.

The coke market continues easy with a light demand. Foundry coke is quoted at $1.80 to $2 per ton, f. o. b. Connellsville. Some of the unknown brands are offered at even lower prices.

Pig Iron.—It may be said in a general way that there is more inquiry, and buyers appear to be taking more interest in the market than for the past two weeks. Traveling salesmen coming in from their trips state that buyers are more definite in their statements as to when they will probably be ready to purchase, and these features give encouragement to the view that more demand may be expected within a fortnight. The principal transaction of the week has been the purchase of the Standard Sanitary Co., which closed on Saturday for 1,400 tons of No. 2 soft, 900 tons of gray forge, 500 tons of No. 2 foundry, 500 tons of No. 3 foundry and 400 tons of silvery, for delivery at Louisville. The foundry grades sold on the basis of $9 Birmingham for No. 2. The leading cast iron pipe interest is inquiring for prices which will be submitted to a meeting of the board of directors on Wednesday. The harvesting machinery industry is reported to have purchased in the neighborhood of 10,000 tons during the week. It is stated that a pipe manufacturer in Northern Ohio has bought in the neighborhood of 3,500 tons of Northern iron, and is in the market from 4,000 to 6,000 tons of Southern iron. It is noticeable that the large interests are about the only consumers asking for prices at this time. The rank and file of buyers are paying but little attention to the market, excepting in a few cases where small orders are coming in to cover immediate requirements. Reports in the trade would seem to indicate that an improvement in the buying may reasonably be expected early in July. In regard to prices it is now clearly established that $9 Birmingham for No. 2 foundry is the open quotation, and is about the only price heard, excepting that two of the leading producers in the South claim to be asking $9.25 and $9.50. We quote:

Southern Foundry No. 1	$12 25 to 12 50
Southern Foundry No. 2	11 75 to 12 00
Southern Foundry No. 3	11 25 to 11 50
Southern Foundry No. 4	11 00 to 11 25
Southern Foundry No. 1 soft	12 25 to 12 50
Southern Foundry No. 2 soft	11 75 to 12 00
Gray Forge	10 50 to 10 75
Northern Foundry No. 1	13 65 to 13 90
Northern Foundry No. 2	13 15 to 13 40
Southern car wheel iron	16 25 to 16 50

Finished Material.—The demand practically represents current requirements, so that orders are limited and trade quiet. Jobbers are carrying light stocks and are not buying to replenish them. Mills are not urging their offerings at concessions excepting on a few lines. Tank plates are quoted dull and weak. Bar iron is quiet and unchanged. Bar iron is easy at 1.40c f. o. b. Steel bars, 1.48c base, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ per cent off. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. .27, 2.60c; No. 16, 2.35c; No. 14, 2.25c; No. 12, 2.16c; No. 10, 2.05c. Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 2c from stock and angles at 1.90c to 2c for base sizes.

In merchant pipe the market is unsettled and prices made by independent mills difficult to locate because of each individual set of specifications bringing out prices. The schedule of the leading interest is being undersold rather generally by independent mills. Even at the concessions business is reported quiet.

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	67.7	57.7	64.7	54.7
½ inch	70.7	60.7	67.7	57.7
¾ to 6 inch, inclusive	74.7	64.7	71.7	61.7
7 to 12 inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The market shows no improvement and continues dull and easy. Old iron axles are marked down about $1 per ton, but other quotations remain unchanged. We quote:

Old No. 1 railroad wrought, net tons	$10 00 to 10 50
Cast machine and foundry, net tons	9 50 to 10 00
Old iron rails, gross tons	12 50 to 13 00
Old steel rails, gross tons	9 50 to 10 00
Old short lengths, gross tons	10 00 to 10 50
Old iron axles, net tons	13 50 to 14 00
Stove plate, net tons	6 00 to 6 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	3 00 to 3 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., June 21.

Pig Iron.—The week under review has been quiet, with business a little slower if anything. The competition for the small tonnage inquired on has been so keen that a further weakening in prices has taken place. In Southern irons, while one large interest still maintains $9.25 Birmingham for No. 2 foundry, several other companies are booking orders at $9, and it can be stated positively that a sale of 800 tons was made a few days ago at $8.75. It looks very much as if further round lots could be placed at this figure. Northern brands have been in such poor demand also that present quotations are about 25 cents a ton lower than those which prevailed a week ago. The outlook for forward delivery at this writing is so poor that many are of the opinion that the market is likely to go on in its present rut for several months. Reports from founders continue to be anything but encouraging and if some statements are to be believed, the tonnage which present melting represents shows a considerable decrease since the month opened. Southern makers have sold about 1,000 tons for export during the past week. New York quotations at tidewater follow: Northern No. 1 X foundry, $14.75 to $15; No. 2 X, $14.25 to $14.50; No. 2 plain, $13.75 to $14; Southern No. 1 foundry, $13.25 to $13.50; No. 2 foundry, $12.50 to $13; No. 3 foundry, $12 to $12.50; No. 4 foundry, $11.50 to $12.

Finished Iron and Steel.—There has been a gratifying increase in the number of small contracts for structural shapes, but large propositions are still being withheld. The independent mills in their anxiety to get business are quoting very low prices, and a good order, especially on a cash basis, can be placed more advantageously now than at any time during the past three years. In sheets no increased activity can be noted, and reports that prices are being shaded on desirable orders are common. Local business in bars is light. The Eastern Bar Iron Association held a meeting in this city during the week, but no

change was made in prices. There is nothing of any consequence doing in plates, and pool prices are being shaded occasionally. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.35c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron and soft steel bars, 1.49½c; sheets, in carload lots, New York, No. 28 black, 2.35c to 2.40c; galvanized, 3.40c to 3.45c.

Old Material.—At present heavy steel scrap in condition for charging is in excellent demand, but holders are unwilling to sell, believing that higher prices are to be looked for. Outside of rails, axles, and wrought iron, old material is only salable at reduced prices. Export trade continues fair. Holders could perhaps realize the following prices per gross ton:

Old iron rails	$14 50 to 15 00
Old steel rails, long lengths	11 75 to 12 50
Old steel rails, short pieces	10 00 to 10 50
Relaying rails	17 00 to 18 00
Old car wheels	11 00 to 11 50
Old iron car axles	15 50 to 16 00
Old steel car axles	14 00 to 14 50
Heavy melting steel scrap	10 00 to 10 50
No. 1 railroad wrought scrap	11 50 to 12 00
Iron track scrap	10 50 to 11 00
Wrought pipe	8 00 to 8 50
Ordinary light iron	6 50 to 7 00
Cast borings	3 50 to 4 00
Wrought turnings	5 50 to 6 00
No. 1 machinery cast	9 50 to 10 50
Stove plate	8 00 to 8 50

PHILADELPHIA.

June 21.

There has been no improvement in business during the past week. Some observers say there are indications of better feeling, but it certainly has not influenced demand. Buyers are making very little effort to beat down prices. They are simply keeping out of the market except when compelled to buy for immediate needs, and then they are willing to pay current prices.

Pig Iron.—There is very little interest in the market. The price of $14.50 to $14.75 for No. 2 X foundry is maintained on the small number of sales that are being made. Production has been sharply reduced by the blowing out of furnaces, but consumption also seems to be decreasing. We quote as follows for Philadelphia and near-by points: No. 1 X foundry, $15 to $15.25; No. 2 X foundry, $14.50 to $14.75; No. 2 plain, $14 to $14.25; Alabama No. 2, rail shipment, $13.75 to $14; Alabama No. 2, on dock, $13 to $13.25; standard gray forge, $13.50 to $13.75; ordinary gray forge, $12.75 to $13; basic, $13.75 to $14.

Finished Material.—The demand is very light and it is doubtful whether prices can be maintained. Mills not included in price agreements are getting a large part of the limited business now being transacted. We quote as follows: Beams, channels and angles, 1.73½c to 1.85c, according to the specifications, and small angles, 1.50c to 1.55c. Bars, both iron and steel, 1.48½c to 1.55c; skelp, 1.45c to 1.50c seller's mill for grooved and a tenth more for sheared.

Old Material.—Prices continue to decline, but the lower quotations do not interest buyers. We quote: No. 1 steel scrap, $11 to $11.50; low phosphorus scrap, $15 to $16; old steel axles, $15 to $16; old iron axles, $16.50 to $17; old iron rails, $4.50 to $15; old car wheels, $11 to $11.50; choice R. R. No. 1 wrought, $12.75 to $13; machinery cast, $11.50 to $12.50; No. 2 light scrap (forge), $10 to $10.50; No. 2 light scrap (ordinary), $8.50 to $9; axle turnings, $9 to $9.50; wrought turnings, $8 to $8.50; cast borings, $6 to $6.50; stove plate, $8.75 to $9.25; wrought iron pipe, $9.50 to $10.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., June 21.

Pig Tin.—Weakness of a profound character developed during the week, and closing prices today form the lowest which have been reached this year. The depression in the market is due to an aggressive bear movement, as a result of heavy arrivals and an exceptionally light demand from consuming interests. The London market for the week has been active but at the expense of prices. Closing quotations today follow: Spot and June, 25⅜c to 25¾c; July, 25¼c to 25½c. Closing London cables today follow: Spot, £116 12s 6d; futures, £116 2s 6d. Arrivals so far this month aggregate 2,245 tons, with 2,169 tons afloat.

Copper.—Outside of an export demand of a fairly heavy character, the market during the week was unchanged, although it is said domestic buying was a little better also. While prices are unchanged, the undertone to them can be said to be a little stronger than a week ago. London during the week was active, and prices show an appreciable advance over those we last quoted. Closing prices today follow: Lake, 12⅝c to 12¾c; electrolytic, 12½c to 12⅝c; casting, 12⅛c to 12¼c. London's closings today follow: Spot, £56 10s; futures, £56 7s 6d. Exports for the month to date amount to 7,900 tons.

Lead.—Is quiet and lower, spot declining to 4.20c and 4.30c. St. Louis is unchanged at 4.10c, and London remains at £11 10s.

Spelter.—Is dull, spot selling at 4¾c to 4⅞c. St. Louis and London are firm at 4.60c and £21 15s, respectively.

Antimony.—Both Cookson's and Hallett's are selling at 7¼c, and other brands at 6¼c.

Quicksilver.—We quote $45 per flask of 76½ pounds in lots of 100 flasks. London is £8.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, June 21.

All metals are in weak demand, and prices are of a downward tendency. Lake copper is quoted 12¾c for carloads, and 13¼c for less than carload lots; casting, 12¾c for carloads, and 13¼c for smaller quantities. Pig tin shows a drop of ½c, and is now quoted at 27½c to 28c, according to quantity. Spelter is off $2, and is now quoted 4.80c to 4.90c in carload lots, and 5c to 5¼c in lesser lots. Sheet zinc is without change, being quoted in this market, 6.20c for car lots of 600-lb. casks, and 6.45c in less than car lots. Pig lead, 4¼c in carloads, and 4.30c to 4.45c in lesser amounts.

There is little demand for old metals, and prices are weak.

Contract for Steel Ferryboats.

The Maryland Steel Co. has been notified by city officials of New York that it will be awarded the contract, amounting to more than $1,000,000, to build five fast, handsomely equipped steam ferryboats to run between New York and Staten Island. The vessels will have steel hulls and will be double deckers.

"The Man, the Dog and the Barn Door" is the title of a clever little pamphlet of the Lucas Machine Tool Co., of Cleveland, that gives evidence in subject matter and illustration of the work of an experienced hand. The story turns on the various forms of waste labor performed in the machine shop, and the writer does not omit to point an effective moral.

The report of the receiver of the Stillwell-Bierce & Smith-Vaile Co., Dayton, O., shows that from Jan. 15 to March 15 the receipts aggregated $220,202.16; disbursements, $206,942.51; the amount of orders booked during that period amounted to $165,257.44; the unshipped orders on hand Jan. 15 aggregated $458,630.58; goods shipped between Jan. 15 and March 15 amounted to $174,590.37.

It is announced in New York that the Pennsylvania Iron Works, of Philadelphia, has been awarded the balance of the Pennsylvania tunnel contract, which would indicate 12,000 tons of screw piles.

The Chicago office of the Nernst Lamp Co., in charge of A. E. Fleming as district manager, has been removed from 638 National Life building, La Salle street, to 99 East Lake street.

PERSONAL.

Frank Drake, chief mining engineer of the Oliver Iron Mining Co., has tendered his resignation to President Cole and has gone to Colorado, where he will locate. Mr. Drake is succeeded by N. J. Wessinger, who has been performing the duties of mechanical engineer.

W. B. Castle, for many years secretary of the Republic Iron Co., has been appointed representative in Cleveland of the Wolvin interests on the Great Lakes.

George J. Gould, head of the Gould system of railways, while in Buffalo Saturday last inspected the new plant of the Lackawanna Steel Co., also the electric power plant on the American and Canadian sides of the river at Niagara Falls.

Charles C. Egbert has been appointed assistant mechanical engineer for the Canadian Niagara Power Co., and will have charge of the installation of the hydraulic machinery in the company's plant at Niagara Falls, Ont. Mr. Egbert has just returned from Zurich, Switzerland, where he has for 18 months been superintending the construction of the 10,000-h. p. turbines designed and manufactured by Escher Wyss & Co., of that city. The first turbine has already arrived in the country and will be installed at the plant as soon as possible.

H. L. Kinsley, who has been with Manning, Maxwell & Moore, of New York, for the last five years and a half, and was formerly with the Hopedale Screw Co., will represent the Warner & Swasey Co. in the East, commencing July 1.

W. F. M. Goss, dean of the schools of engineering of Purdue University, received on Wednesday last the honorary degree of Doctor of Engineering (D. Eng.), which was bestowed by the University of Illinois.

William N. McKnight, for a number of years special agent and metallurgist for the Harbison-Walker Refractories Co., has recently resigned to accept the position of general manager of the Federal Refractories Co., whose plant for the manufacture of silica, magnesia and chrome brick is now building at Alexandria, Huntingdon county, Pa.

Charles Holdrege, 317 Railway Exchange bldg., Chicago, formerly manager of the railway sales department of Hibbard, Spencer & Bartlett, Chicago, has been appointed general sales agent of the Franklin Railway Supply Co., Franklin Mfg. Co., Franklin Machine & Tool Co., Colborn Machine Tool Co., and Keystone Drill Co., all of Franklin, Pennsylvania. Mr. Holdrege also represents the Kent Mfg. Co., formerly the Railway Speed Recorder Co., Kent, O., in the sale of its core making machine.

Received from the Trade.

The Falls Rivet & Machine Co., Cuyahoga Falls, O., has issued a descriptive catalogue of the Wadsworth improved core making machine. It is claimed that this machine makes a cored hole equal to a bored one, and that the core can be cleaned out with a lead pencil. No core boxes are required or ramming of sand by hand. No paste is used. The capacity of the Wadsworth machine is stated to be one core a minute of any size from ⅜ in. to 6 in. and 40 inches in length. All cores made on this machine are one-piece cores, having the vent perfectly centered.

The National Radiator Co., Johnstown, Pa., in a new circular describes its wall radiator, which it is just placing on the market. This is in the nature of a specialty and is in addition to the company's complete line of hot water and steam radiators.

A series of 16 illuminated cards, 3¼ x 5½ in., by the Brown Hoisting Machinery Co., of Cleveland, has been prepared for distribution at the St. Louis Exposition. For the most part they bear illustrations of the various styles of cranes manufactured by the company and show the service in which these are employed. The back of the card gives data concerning the particular crane illustrated. There is also a card each for the Brown fast-plant unloaders, steel plate trolleys, and crabs and winches.

Reduced Southern Freights Discontinued.

The reduced freight rates on pig iron from the South to Milwaukee, Chicago, Detroit, Indianapolis and points in the gas belt will be withdrawn on July 1, and rates in effect prior to March 17 will again become effective. The reduced rates were put in force experimentally, it being urged by some of the carriers that the reductions would stimulate a movement of pig iron. There has been no increase in the movement under the reduced rates; in fact, it is stated that a decrease is shown, therefore the rates are to be restored. The reduction amounted to 20 cents to Chicago; the old rate going into effect July 1 is $3.85.

All lake records for iron ore cargoes were broken June 19 when the new steamer Augustus B. Wolvin on her maiden voyage took out of Two Harbors 9,227 gross tons or 10,694 net tons of ore. The largest previous cargo was that of the William Edenborn, amounting to 8,807 gross tons from Escanaba to South Chicago last year. The Wolvin's cargo will be delivered to the Lackawanna Steel Co., Buffalo.

E. L. Harper, formerly vice president of the Fidelity Bank of Cincinnati, and more recently president of the Big Stone Gap Iron Co., Big Stone Gap, Va., and vice president of the Union Iron & Steel Co., Ironton, O., has filed a petition in bankruptcy at Abington, Va. He states that his total assets are $50. His liabilities are said to be $200,000.

The rolling mill of the Minnequa plant of the Colorado Fuel & Iron Co. is now in operation and nearly every part of the large plant is a scene of activity. The number of employes is not as large as at the time of closing down the works, but it is stated that the output will very closely approximate that which prevailed previous to the suspension, owing to improved methods and a determination to make each department a paying proposition.

The United States Steel Co., of Everett, Mass., and its officers have been made defendants in a bill in equity, entered in the Superior Court at Boston by A. Gustav Lundin. Lundin is seeking to prevent disposition of patents relating to a secret process for making steel castings, which he alleges were assigned to the steel company without consideration, and with a view to deprive him of his rights in the patents. Lundin also asks for a receiver for the steel company pending the determination of the question relating to his assignment of the patents to the corporation.

C. A. Dielhenn, who established the Cleveland branch of the Medart Patent Pulley Co. about seven years ago, has resigned his position as manager to embark in business for himself, under the style of the C. A. Dielhenn Co., machinery sales agents, 1524-25 Williamson building, Cleveland. The new firm will act as general selling agents for engines, boilers, motors, power transmission equipment, etc. The other active member of the company will be A. A. Holbeck, M. E., who has been associated with Mr. Dielhenn heretofore.

It was reported in New York last week that Charles M. Schwab was to become president of the Bethlehem Steel & Shipbuilding Co., as the rehabilitated United States Shipbuilding Co. will be known. This report has since been denied, but it is said that Mr. Schwab will take a very active interest in the operation of the concern and that J. R. McIlvaine, president of the Bethlehem Steel Co., will become head of the shipbuilding company. It is also reported that Jos. E. Schwab, formerly president of the American Steel Foundries, will have an active part in the management of the Bethlehem plant.

At the request of the Secretary of the Treasury the Attorney-General has directed that an appeal be taken from the decision of the United States Court overruling the Board of General Appraisers in the Crucible Steel case. The question involved in this case is whether the process of pickling to which the steel strips imported had been subjected was a necessary part of cold rolling and was not done to lay the foundation for polishing and brightening the metal. The Board of General Appraisers held that the steel strips in question were subject to the additional duty provided in paragraph 441 of the Dingley Act for steel that had been polished and brightened. This was overruled by the court.

BETHLEHEM STEEL CO.'S EXHIBIT AT ST. LOUIS.

The exhibit of the Bethlehem Steel Co., of South Bethlehem, Pa., at the St. Louis World's Fair is located in the Mines and Metallurgy building, and occupies a space of 120 x 62 feet directly fronting its northeast entrance. Two-thirds of the space, an area of 80 x 62 feet, has its floor level below that of the floor of the building, it being necessary, owing to the great weight of many of the exhibits, to set them practically on the ground. Exhibited here are iron, carbon steel and nickel steel castings, finished guns and carriages which have been designed and built by the company for land and naval service, and large and small carbon and nickel steel forgings of various degrees of finish, ranging from the forging as coming from the smith shop to finished material made to the highest degree of accuracy. There are also exhibited in this space, tested armor plate, and a full-sized model of a finished armor plate and of an ingot of the size required in its manufacture.

An exhibit which shows the operations required to make a finished armor plate from the ore, the amount as well as the nature of the materials consumed and also the time taken by each operation, is placed on stands which extend along the walls of the depressed floor space, and on the walls are photographic views of the company's plant and of manufactured material, including views of forgings, castings, guns, armor plates and machines. Beyond the depressed position, toward the center of the building and on the main floor level, is a battleship turret with two 12-inch guns with a rapid ammunition handling device, all being capable of operation by electric power. On the floor space around the turret are placed lighter ordnance material, ammunition, and small castings and forgings.

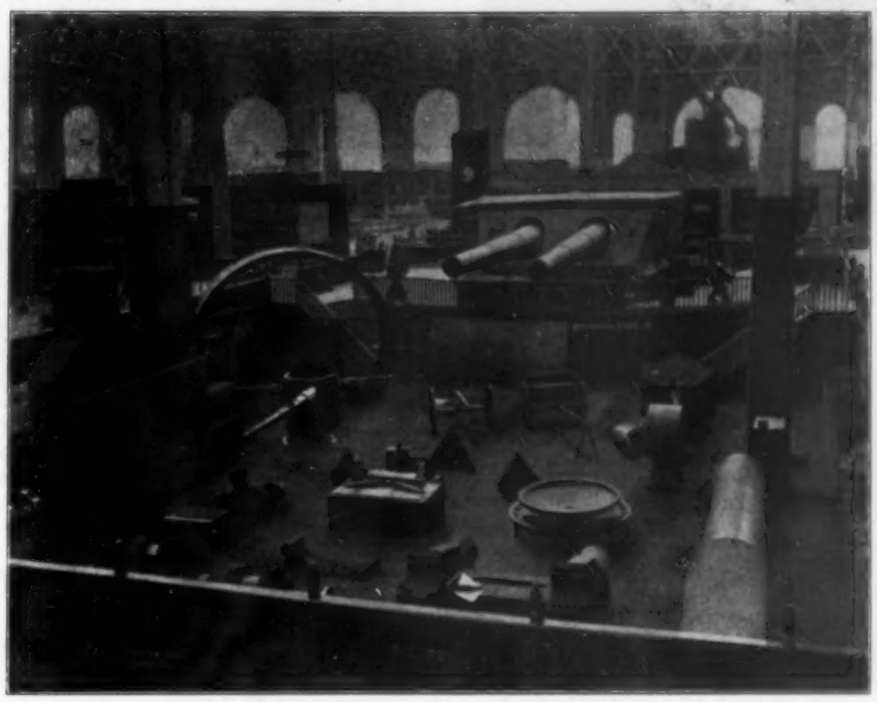


EXHIBIT OF THE BETHLEHEM STEEL CO. AT THE LOUISIANA PURCHASE EXPOSITION.

Federal Refractories Company.

The organization of the Federal Refractories Co. was completed at a meeting of stockholders at Alexandria, Huntingdon county, Pa., on June 11, the following officers being elected: Joel H. Fuller, of the Stowe-Fuller Co., Cleveland, president and treasurer; John Phillips, of Alexandria, vice president; Wm. G. Kenaga, of Cleveland, secretary; Wm. N. McKnight, of Pittsburg, general manager; M. J. McEvoy, of Kittanning, superintendent. The company owns valuable lands and leases at and about Alexandria, a total of 1,600 to 1,700 acres, in which there is a practically inexhaustible supply of silica rock, adapted for use in the manufacture of highly refractory silica brick. The rock is so located that it can be delivered at the works by a tram road with easy grade, at a minimum of expense, no rehandling being required. A large force of men is now engaged in building the plant and the tram road. The capacity of the works will be 40,000 silica brick a day, in addition to magnesia and chrome brick from imported material. The company has contracts that will call for a considerable portion of its output.

Frederick Siemens and His Work.

In connection with an announcement of the recent death at Berlin, in his 78th year, of Frederick Siemens, the eminent German manufacturer, the London *Iron and Coal Trades Review* says: "The Siemens family was one of the most notable that even Germany has produced. Werner, William and Frederick are best known in the realm of applied science, and did the most to develop new forms and phases of industry, but the others were, in their several ways, almost equally exceptional. It was Frederick who originated the open-hearth furnace, and since the death of his brother William—who recognized its value for the melting of steel and sought and effected a combination with M. Martin, whereby the Siemens-Martin process became established—the steel-melting furnace branch of the business has been managed by him, mainly through the intermediary, first of Mr. John Head, and more recently of Mr. Harvey, of Queen Anne's Gate. Mr. Frederick Siemens, however, was not so well known in England as his late brother William. He rarely came to the front at Iron and Steel Institute meetings, or other similar functions; and he was probably much more interested in the glass industry, which he did much to improve than in that of steel. Nevertheless, probably no invention connected with the steel industry has been of more solid value than his open-hearth furnace."

The open-hearth process was originated by Frederick Siemens about 1863. An important stage of its progress was the invention of the regenerative furnace, which, founded on researches by Sir William Siemens into the whole theory of heat, was primarily the idea of his brother Frederick, who conceived the view that the regenerative principle, which Sir William had for a number of years been trying to carry into effect by a complex arrangement of engines and condensers, might be made available in a much more simple manner by its direct application to ordinary fuel-consuming furnaces.

The Empire Steel & Iron Co. has declared its semi-annual dividend of 1½ percent on its preferred stock, payable July 5.

TESTING SHEET STEEL FOR ELECTRICAL PURPOSES.*

BY C. E. SKINNER.

At the present time the rate of consumption of sheet steel in the manufacture of electrical apparatus in the United States alone is probably not less than 100,000,000 pounds (50,000 net tons) per year. Assuming that 20 percent of this material is subjected to the conditions under which the so-called iron loss occurs and that this loss is one and one-

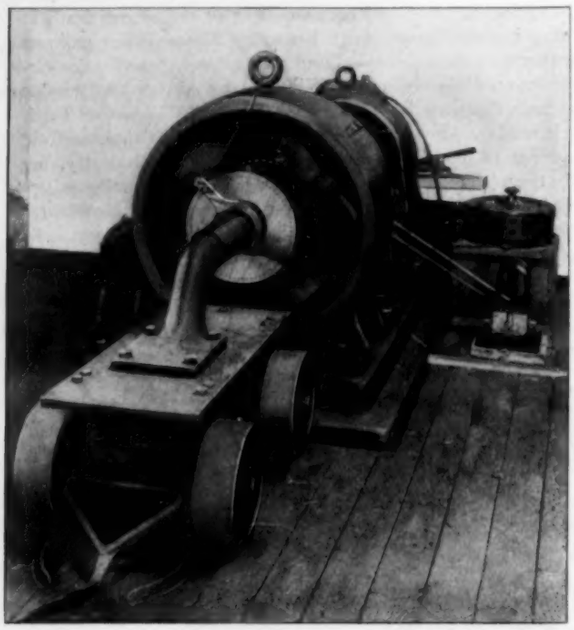


FIG. 1.—SHEET STEEL TESTING DEVICE, ARMATURE METHOD. TEST SAMPLE AND CONTACT DEVICE SHOWN IN POSITION.

half watts per pound, we find we have a total loss of 30,000 K. W. (40,000 H. P.), or an amount of power approaching the output of the largest single electrical power station in existence. At the rate of $25 per horsepower per year, this represents a money value of $1,000,000. This loss manifests itself as heat in the apparatus and therefore serves no useful purpose, but forms one of the limitations to the output of the apparatus. The losses referred to are the hysteresis and eddy current losses, more commonly combined under the general term "iron loss." This loss occurs in all magnetic material which is subjected to alternating magnetic stresses, the amount of the loss in any given material depending upon a number of conditions which will be referred to later. In general the following must be taken into consideration in connection with the testing of sheet steel for electrical purposes:

(1.) The losses in different sheet steels vary greatly with the chemical composition and with the physical condition due the heat treatment and the mechanical working which the steel has received.

(2) In most sheet steel the losses may be reduced by annealing to a relatively small value.

(3) Nearly all steels, when the losses are reduced to a low value by annealing, are subjected in a greater or less degree to aging, or increase in loss, due to the influence of comparatively low temperatures.

(4) The permeability of all steels which may be rolled commercially differs by a comparatively small amount, no matter what their condition with respect to annealing.

(5) In all commercial sheet steels the physical characteristics are well above the service requirements.

The commercial testing of sheet steel for electrical purposes, therefore, resolves itself into:

(a) Chemical tests to determine the composition of the steel.

(b) Electrical tests to determine the losses in the steel after punching, before and after annealing.

*Read at the Atlantic City meeting (June, 1904) of the American Society for Testing Materials.

c) Electrical tests to determine whether aging, or increase in the losses, occurs when the steel is subjected to moderate temperatures.

(d) Tests for permeability.

Chemical Tests.

Sheet steel used for electrical purposes is always a very mild steel, the carbon rarely being above 0.15%, the phosphorus, sulphur, silicon and manganese also usually being kept quite low. The composition may vary over comparatively wide limits and the steel still fulfill the necessary conditions as to quality. One or two complete analyses from each heat and occasional check analyses from the sheet before and after annealing are usually sufficient for the purpose.

Electrical Tests.

By far the most important tests are those to determine the hysteresis and eddy current losses, either separately or combined, the amount of these losses showing the electrical quality of the steel.

Hysteresis Loss—Hysteresis loss may be defined as the work done in reversing the magnetism in the steel, and it may be considered as the molecular friction due to the reversal of the magnetism, this friction manifesting itself as heat. The amount of hysteresis in a given steel varies with the composition, with the hardness, with the maximum induction at which the steel is worked, with the frequency of reversal of magnetism, with the wave form of the applied electro motive force used in the test, and with the temperature of the test sample. The hysteresis loss is greater as a rule in hard steels than in soft steels. It varies approximately as the 1.6 power of the induction, and directly as the frequency. It is greater with a flat top or a sine wave electro motive force than with a peaked or a saw-toothed wave.

Several instruments have been devised for measuring the hysteresis loss in steel. The Ewing hysteresis meter is probably the best known and most used. With this instrument, samples weighing only a few ounces are required for the test, the measurements being made at a fixed induction and the instrument calibrated so as to read direct in some convenient unit. A complete description of this instrument and the method of its working may be found in the Journal of the Institution of Electrical Engineers (London), Vol. 24, page 398. Other instruments employing the same general principle or entirely different methods are available for measuring hysteresis loss, but as these may all be found in the text books of the day their description will not be given here.

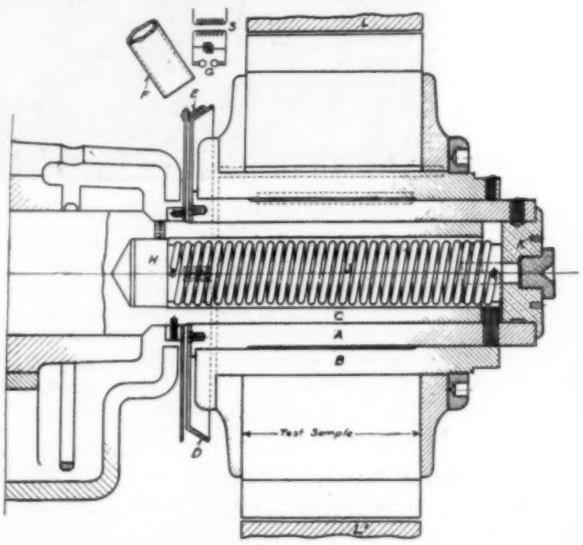


FIG. 2.—DYNAMOMETER FOR MEASURING ARMATURE LOSSES.

Hysteresis measurements are valuable as showing the effects of annealing, but as it is very difficult in practice to separate the hysteresis loss from the eddy current loss and, as the total loss under working conditions is the point of vital importance to the user of the steel, measurements of hysteresis loss alone become, in general, of secondary importance.

Eddy Current Loss.—This is the loss due to the circulation of electric currents in the sheets themselves and be-

tween adjacent sheets, due to the steel acting as a conductor in an alternating magnetic field. The eddy current loss varies inversely as the ohmic resistance, directly as the square of the induction, and decreases as the temperature increases. It is greater in thick sheets than in thin sheets, and is greater as the insulation between adjacent sheets is less. Tests for eddy current loss alone are difficult to make, and as far as the writer is aware, no instrument has been devised for this purpose. An approximation of the amount of eddy current loss in a given sample can be reached by measuring the total losses at different inductions and assuming that the eddy current loss varies as the square of the induction and the hysteresis loss as the 1.6 power of the induction. For special investigations the eddy current loss is sometimes calculated in this way, but commercially such tests are rarely considered. The measurement of the total losses under working conditions gives the best index of the electrical quality of the steel. As the total loss is made up of the combined hysteresis and eddy current losses it is subject to all the variations of each as outlined above.

Measurement of Total Losses.

In commercial routine testing as followed out in the sheet steel testing department of the Westinghouse Electric & Manufacturing Co., of which the writer has charge, two separate methods which may be designated as the transformer method and the armature method have been found very satisfactory. In both these methods of testing, commercial conditions of operation have been aimed at in order that the results obtained might be checked with the tests made on similar material in commercial apparatus. The test samples have also been so chosen that they will be available for commercial apparatus later, this effecting a considerable saving of material where many tests are made.

The transformer method has been so called for the reason that the test sample consists of about ten pounds of punchings of a standard transformer plate, these punchings being built up in the same manner as when used in the transformer. For convenience in handling and winding the test sample, a block carrying the coil has been devised, this block being split and the wires of the coil continued between the two parts by means of mercury cups and contacts. By this means, samples which are built up or plates which are not split may be used and placed on the testing block with the winding in place in a few seconds. The routine tests on such samples consists in measuring the total losses at a given induction and frequency, by means of a wattmeter. For special tests the induction, frequency, wave form, and the pressure on the sample are varied as desired.

This test is used regularly for judging the quality of each lot of steel as received, for judging the quality of the annealing of each furnace load of material, and for determining the aging on all classes of material. From 20 to 50 tests per day are made on this apparatus by one operator. In making tests of this kind the wave form of the applied voltage must be known and should preferably be a sine wave. Correction must be made for the copper loss in the magnetizing coil; correction must be made for the losses in the voltmeter and wattmeter, or these losses must be eliminated in the measurements. The test samples must be at approximately uniform temperature.

The armature method is so called for the reason that the test sample consists of standard armature punchings, which are revolved in a standard form of dynamo field. The measurements are made by means of a spring dynamometer. A testing device of this kind is shown in Fig. 1, and a detail drawing of the dynamometer used for reading the losses is shown in Fig. 2. The general plan of this apparatus is as follows: A small variable speed, direct current motor has a shaft extension on which the sample is mounted. The speed is read in terms of voltage across the terminals of a small magneto which is belted to the motor shaft and shown to the right in the view. The test sample is revolved in a field having specially wound field coils and adjustable pole pieces. The extension shaft on which the sample is mounted carries a spring dynamometer with a special device for reading the deflection on this dynamometer when the sample is in motion. The sleeve which carries the sample is provided with heavy flanges and is adapted to be placed in an hydraulic press so that any desired degree of pressure may be reached and maintained on the sample during the test.

The very unique spring dynamometer used in this device was designed by Mr. S. M. Kintner and deserves special notice. As will be seen from Fig. 2, the hollow shaft C contains a spiral spring J, the inner end H being rigidly held to the shaft while the outer end is fastened to the sleeve A on which the sample is mounted. The shaft carries a pointer E and the sleeve a circular disc D approximately eight inches in diameter, graduated on its beveled face in a uniform scale to small divisions. In close proximity to the scale is placed a spark gap G, which is in series with the secondary of the induction coil S. The primary of the induction coil is connected to a contact device on the motor shaft, the break point being exactly in line with the pointer E. Leyden jars are used across the secondary of the induction coil to cut down the duration of the spark. The scale and the pointer are shielded from the light of the room, and a tube F is provided for observing the scale and pointer at the exact angular position occupied when the spark passes across the air gap illuminating the scale and pointer for an instant at each revolution of the shaft. By this means it is perfectly feasible to read to a high degree of accuracy the deflection of the spring when the scale and pointer are both revolving at a speed of from 1,000 to 2,000 revolutions per minute. The bearing between the sleeve and shaft is nicely ground and well lubricated so that there is practically no friction whatever when the test sample is in motion. The apparatus is calibrated by measuring the torque on the spring for an observed deflection. The loss in the sample is then measured in terms of torque and speed, reducing this, if necessary, to the ordinary units of watts per pound in the test sample. For comparative work this reduction is not necessary.

By varying the field strength, the air gap, the form of pole pieces, the speed, and the pressure on the sample, tests under a wide range of conditions are obtained. The windage may be measured by taking readings on the dynamometer with

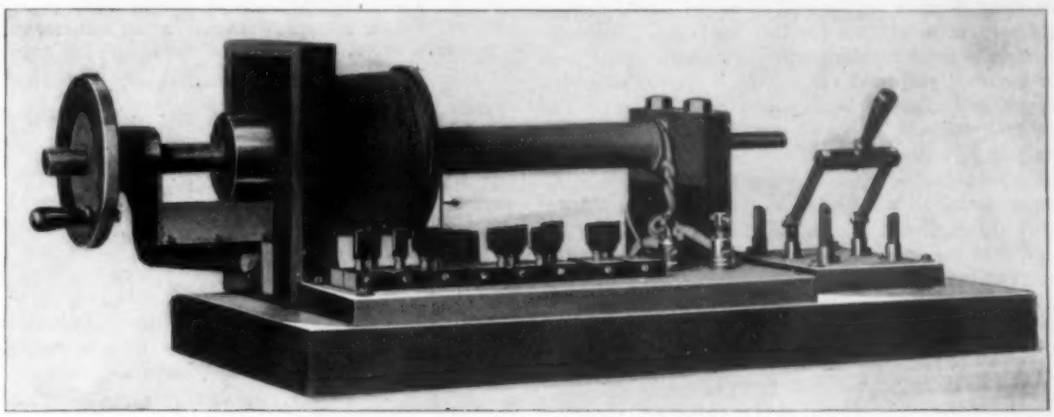


FIG. 3.—PERMEABILITY METER, LAMB & WALKER PATTERN.

no current in the field. In special tests, complete curves are taken at varying speeds and field currents. In routine tests only a few points are taken.

For convenience in handling the samples, which together with the sleeve weigh approximately 125 pounds, a special truck shown in the foreground, Fig. 1, has been devised, by means of which the sample can be carried about and very quickly placed in position on the testing shaft with a minimum amount of labor.

The above apparatus is used for determining the quality of armature steel as received and the quality of the annealing. It forms a most convenient method of studying the variation in armature losses due to varying conditions, such as pressure, insulation between sheets, variation in induction, variation in form of armature slot, etc. The actual induction may be measured by means of a special coil slipped on the armature punching, the leads of which are brought out to a contact device mounted on the special truck used for carrying the test samples. This device has been in constant use for several months and has been found so satisfactory that it may be confidently recommended to those desiring to make similar tests.

Tests for Aging.

It was discovered about ten years ago that when sheel steel is annealed so as to have a low loss and then subjected to a temperature of from 80° C. to 100° C. the loss sometimes increases, in some special cases this increase being as much as 100% in ten days. Fortunately such cases are rare, and ordinarily the increase is small or there is no change whatever in the loss.

As the aging depends on the kind of material used and on the heat treatment to which it has been subjected, it becomes very desirable to make regular routine aging tests on all steel used for electrical purposes. This is all the more necessary as it is practically impossible to always get steel which has been subjected to identical treatments. These aging tests consist merely in repeating the measurements for total losses at certain definite periods of time after the initial tests, the sample being subjected in the interim to the aging temperature. Tests after ten days and after thirty days in the aging oven usually give the necessary data for judging the quality of the material. For purposes of investigation, longer tests are frequently necessary, especially when the effect of temperatures lower than the regular aging temperature is desired. In the tests with which the author is familiar, aging tests are frequently run for six months or a year, and some special tests have been in progress for approximately ten years.

The transformer samples are usually used for the aging tests on account of there being less material to handle and the tests being more easily made than with the armature samples.

The aging oven used for these tests consists of a large wooden box covered on the outside with galvanized iron and lined with asbestos. Steam coils are located at the bottom and ventilators are provided at the top and bottom so that a slight circulation of air may be secured to equalize the temperature. Steam at 150 to 180 pounds pressure is used for heating. The oven is divided into two parts, one of which runs normally at a temperature of very approximately 95° C. and the other at 60° C. to 65° C. These temperatures are maintained year in and year out, and the oven usually contains from 100 to 200 samples which are undergoing the aging test. The temperatures mentioned were selected for the reason that the higher temperature is comparatively easy to maintain and gives comparatively rapid aging when a material is found which is subject to aging, and the lower temperature represents very approximately the temperature at which ordinary electrical apparatus will run under normal working conditions.

Permeability Tests.

As stated earlier in this paper, the permeability of sheet steels used for electrical purposes varies over comparatively small limits, and the exact permeability of a particular sample is ordinarily not of great importance. It is not customary, therefore, to make routine tests for permeability. Occasional tests are advisable, however, and for this purpose a modified permeability meter designed by Messrs. Lamb and Walker and described in the Journal of the Institution of Electrical Engineers (London), Volume 30, Page 930, is generally used. This instrument arranged for measuring solid material in the form of round bars is shown in Fig. 3. For measuring sheet steel, the form of the coil and sample holders is changed so as to take rectangular sections. Strips of steel to be measured are sheared to the proper dimensions and clamped in blocks made for the purpose, the measurements being made exactly as in the case of solid material. With this instrument a complete permeability curve with hysteresis loop may be taken in a comparatively short time. The accuracy is not as great as with the well known ballistic method, but it is sufficiently accurate for the purpose and the tests are much easier to make.

The intention of this paper has been to bring before the society some methods of testing which are in daily use and which have been found very satisfactory for the purpose for which they are intended. They are not laboratory methods as the term is usually understood, but they are capable of giving valuable results from an investigation standpoint as the results obtained may be applied directly to commercial apparatus. It is evident that any work that can be done to reduce the losses in electrical steel and prevent aging when the losses are reduced will be of great value to all manufacturers and users of electrical apparatus.

Results of Tests of Hangers.

Below are given the results of tests made by the Riehle Bros. Testing Machine Co., of Philadelphia, on a cast iron hanger and the pressed steel shaft hanger manufactured by the Standard Pressed Steel Co., of Philadelphia:

Cast Iron Hanger.

Load in pounds.	Deflection in inches.	Permanent set in inches.
200	.010	....
500	.029	....
1,000	.073	.024
1,500	.115	.037
2,000	.147	.048
2,500	.193	.06
3,000	.254	.085
3,500	.353	.133

After applying 3,500 pounds and observing deflection and set, the load was again applied to the hanger, the tension leg breaking when a load of 3,500 pounds was reached.

Pressed Steel Hanger.

Load in pounds.	Deflection in inches.	Permanent set in inches.
200	.0035	....
500	.012	....
1,000	.030	.003
1,500	.060	.02
2,000	.087	.028
2,500	.116	.038
3,000	.144	.056
3,500	.181	.074
4,000	.238	.110
5,000	.497	.299

After 5,000 pounds readings of deflection and set were not taken, and the load was continued up to 7,160 pounds.

With a view to giving their future mechanics a practical knowledge of what has been accomplished in structural steel and machine work by the United States and other countries, the Midvale Steel Co., of Philadelphia, is sending all the apprentice boys under 21 years of age to the St. Louis Exposition on a two weeks' vacation.

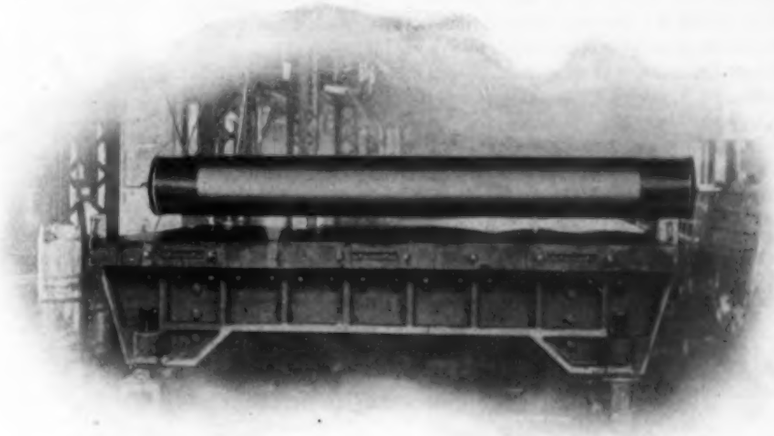
The annual meeting of stockholders of the Columbus Iron Works Co., Columbus, Ga., was held June 13. Capt. George B. Whiteside, the former secretary and treasurer, was elected president; A. J. Teague was elected vice president and secretary and treasurer. George Brown, who was the president, was elected general superintendent. The old board of directors were elected as follows: J. H. Martin, George W. Brown, A. J. Teague and George B. Whiteside, of Columbus, and W. M. Teague, of Montgomery.

NOTEWORTHY CASTINGS FOR PLATE GLASS WORK.

The Braddock Machine & Mfg. Co., Braddock, Pa., has just shipped to the St. Louis Plate Glass Co., St. Louis, Mo., a complete casting table outfit comprising a roller, table, hydraulic cylinders and plungers, ball-bearing center, girders, jacks, wheels and axles with ball-bearings, also grinder and polisher runners, spiders, etc. The table is composed of nine cast iron sections 15 inches wide, 9 inches thick, and 18 feet long, jointed at both ends with keys and three tie rods bolting through the sides. Air furnace iron was used to secure a uniform grade, each section being of the same density. After the castings had been planed on the top surface and both sides, they showed a close, even-grained iron without a blemish. Not a casting was lost on account of a defect, though in ordinary practice the making of these castings is attended with losses going as high as 60 percent.

The roller was 20 inches diameter with 12-inch core x 14 feet long. This was made of a close charcoal air furnace iron, When finished, it had over 4,000 corrugations 2-100 inches deep turned on its surface, there being 28 corrugations to the inch. It is considered one of the most noteworthy pieces of work ever turned out of this description.

The Braddock Machine & Mfg. Co. has recently installed a 10-foot planer and 16-foot boring mill and is equipped to manufacture all kinds of machinery for plate glass plants. The company has two foundries of 60 tons capacity and can make castings up to 25 tons in weight. Special attention is paid to the mixing of iron used in castings, consideration being given to the requirements of the castings. All the mixing is done by analysis.



NOTEWORTHY AIR FURNACE CASTINGS FOR PLATE GLASS WORK.

The General Railway Signal Co. of Gates, Monroe, County, N. Y., has been incorporated with a capital of $5,000,000, as the merging company for the consolidation of the Pneumatic Signal Co. of Rochester and the Taylor Signal Co. of Buffalo. The headquarters of the consolidated company will be in Buffalo and, as stated in a previous issue, both the Buffalo and Rochester plants of the merged companies will continue to be fully operated and it is probable that the Buffalo plant will be enlarged somewhat later on. The officers of the new company are: President, Wilmer W. Salmon, of the Taylor Signal Co.; first vice president, Frederick Cook, of the Rochester Co.; second vice president and treasurer, Geo. D. Morgan, Buffalo; third vice president, T. A. Smyth, Rochester; secretary, Clarence H. Little, Buffalo; chairman board of directors, John M. Beckwith, Rochester.

At a meeting of the stockholders of the Niagara, Lockport & Ontario Power Co., held at Lockport, N. Y., on the 18th inst, the capital stock of the company was increased to $10,000,000. Two corps of engineers have been engaged and will at once begin a final survey of the route of the power canal between the Niagara river and Lockport.

SPECIFICATIONS IN THE FOUNDRY.*

BY DAVID REID, COLUMBUS, O.

For the many years past the foundry had had the notoriety in the mechanical world of not being able to conform closely to definite requirements of strength in the product turned out. Engineers and designers had to therefore make very liberal allowances in selecting their factors of safety. Competition and the advance of knowledge are compelling us to discard the old rule-of-thumbs methods, and look more closely into the ways by which given requirements may be fulfilled. Specifications, the things that are always seen in other industries, are now becoming more strongly pushed in ours, too fast perhaps for some of us, but nevertheless they are coming and will stay.

The average foundryman makes his first and greatest mistake when given drawings and specifications to figure on, by simply glancing over those specifications, tossing them into the corner, and then devoting hours and days in scheming how high to make his price, and how low to cut the costs, so that the job may be secured and yet be profitable. If the terms of the specifications define the material as cast iron No. 1 with a tensile strength of 23,000 per sq. in.; or No. 2, to be high grade cast iron or gun iron, to be made of charcoal metal, in the air furnace, or other process giving a product with a tensile strength of not less than 28,000 lbs. per sq. in., with an elongation of 0.25 percent before rupture, while under strain. If he has these things to meet, he often passes them from his mind with the feeling that good commercial work will cover this all right, takes the contract, only to have his eyes opened, and his credit and bank account impaired, on account of his inability to carry out the specifications as agreed.

The writer has had a number of instances of this kind drawn to his attention during the last six months, and is presenting this matter with the idea of showing that specifications are being constantly drawn up, not for the purpose only of getting good commercial products, but to obtain something far superior to everyday castings.

The specifications for the No. 2 cast iron mentioned above, which are those of the ordnance department, have been recently made more stringent for a special contract I was engaged upon, and are as follows: Material to contain silicon 1.25 to 1.35, sulphur not over 0.12, phosphorus not over 0.45, manganese 0.65 to 0.75, tensile strength 30,000 to 35,000 per sq. in., elongation before rupture 0.25 percent.

To the credit of the American Foundrymen's Association, and the Cast Iron committee of the American Society for Testing Materials, be is said that we were in position to carry out such severe specifications, for their investigations have enabled us to specify in turn our pig irons in such a way that the furnaces could furnish just what was wanted.

The two classes of cast iron mentioned above, while very

*Read at the Indianapolis meeting of the American Foundrymen's Association, June, 1904.

similar as to strength, differ in that in the first case they call for charcoal iron melted in the air furnace, or a similar process giving the required elongation; and in the second, the mixture of cast iron and steel scrap, erroneously called semi-steel, is directly specified. Foundries heretofore making this No. 2 iron have always gotten the required strength by the use of steel scrap additions, but the general orders of last November, from the Ordnance Department prohibited the making of this material, and compels the foundryman to stick to pig iron and scrap.

If great care is used this specification can be met, whether the air furnace or the cupola is used. I have had results which averaged 30,000 lbs. with greater elongation than required, by using charcoal irons with silicon 1.10 sulphur 0.065 to 0.075, phosphorus 0.30, manganese 1.15, and the total carbon from 3.00 to 3.50. The best scrap was used, and ran about 1.65 in silicon.

In the so-called semi-steel specifications we used a Southern iron in connection with the charcoal iron, and 40 percent of clean steel scrap. The results were highly satisfactory.

While these cases are no doubt special, and high grade material is required, they recall the words of Dr. Dudley, in his address on "The Making of Specifications," delivered before the American Society for Testing Materials last year. He speaks of the fault characteristic of many specifications, being the effort on the part of the one drawing them up to make it a place to show how much he knows, putting in too many restrictions, and making the document too severe.

While heartily in favor of and preferring to work to specifications, the writer believes that the foundry industry has not yet reached the point where engineers can give full sway to their knowledge and imagination, too often the latter, in drawing up specifications for castings. The efforts of the American Society for Testing Materials, of which this association is a component part, to make their specifications for pig iron, cast iron, and a variety of classes of finished castings, the standard for the whole world, is therefore to be commended and should have the full support of every member of our association.

Sloss-Sheffield Steel & Iron Co.

The quarterly statement of the Sloss-Sheffield Steel & Iron Co., with May estimated, shows a loss compared with a year ago in excess of 50 percent. The comparison for three years:

	1904.	1903.	1902.
Net profit	$ 278,485	$ 650,718	$307,617
Depreciation and rentals		42,738	35,643
Net earnings	278,485	607,980	271,974
Interest and taxes	60,000	60,000	60,000
Balance	218,485	547,980	211,974
Dividend pfd. stock	114,000	114,000	114,000
Surplus	104,485	433,980	97,974
Previous surplus	2,344,261	1,645,680	614,391
Total surplus	2,448,746	2,079,660	712,365

Among sales made by Crocker-Wheeler Co. in the past week is one for electrical machinery to the value of about $30,000 to the Barbour Flax Spinning Co., Paterson, N. J. The equipment includes a 600-k. w. standard direct current 250-volt generator, and motors, with ratings from 5 to 100-h. p., aggregating 515 h. p. Also for its plant in Baltimore, the W. & J. Knox Net & Twine Co., the same company has bought a 100-k. w. generator and 75 h. p. in motors. The United States Naval Academy, Annapolis, has just purchased two 250-k. w. Crocker-Wheeler generators for a two-unit, three-wire lighting system; and the J. B. Williams Co. of Glastonbury, Conn., a 150-k. w. engine type generator. Armour & Co., Chicago, who already use Crocker-Wheeler motors to the amount of about 7,000-h. p., have placed an order for three more machines aggregating 110-h. p. Twenty-eight motors of the same make with a combined power of 253 h. p., have just been purchased by the Traitel Marble Co., Ravenswood, L. I.

The Engineering Co. of America, 74 Broadway, New York, which has been engaged in purely professional work, has decided to engage in the general engineering, construction and contracting business, in addition to the work heretofore carried on.

TRADE PUBLICATIONS.

Recent products of the publication department of the Joseph Dixon Crucible Co. are entitled "Graphite as a Lubricator," "Slipping Belts" and "Oil vs. Grease." The former gives copious notes on the manifold uses of graphite as an accessory for engineers, dwelling on the two-fold objects of lubrication, the necessity of more perfect lubrication and giving a scientific estimate of the value of flake graphite. The belt leaflet goes into the causes of slipping belts and the conditions that justify the use of a belt dressing. In "Oil vs. Grease" the advantages of graphite grease are set forth. Two leaflets have also been published lately by the Dixon company referring to graphite cup greases and to Ticonderoga grease.

Under the title "Stock Hobs" the R. D. Nuttall Co., of Pittsburg, brings out a pamphlet dealing with this important item in the manufacture of worm gearing. The production of an accurate hob is a long operation and an expensive one, and the R. D. Nuttall Co. submits a list of hobs with the statement that when none of these stock sizes can be utilized it will manufacture special hobs.

In their pony catalogue No. 44 Dean Bros. Steam Pump Works, Indianapolis, Ind., give reduced cuts of their pumps for varying lines of service, together with dimensions and details of efficiency. The Dean Bros.' steam valve gear is prominently illustrated and described.

From the Bassett-Presley Co., of Cleveland, we have a leaflet, "Facts About Charcoal Iron vs. Steel." It relates to the Bassett charcoal iron roofing tin and gives results of some comparative tests of tin plates made from steel and other plates made from charcoal iron.

A catalogue 7 x 10 inches, an unusual size for this company, has just been prepared by the Ingersoll-Sergeant Drill Co., of New York, and is No. 35 of the company's series dealing with the air compressors for all duties and pressures. The catalogue is spoken of as advance sheets of a larger one, and yet it is complete in itself. It contains a series of views of standard types and prominent installations. Brief details accompany each view, but there are no long descriptions. The frontispiece is a view of the new works at Phillipsburg, N. J., the largest manufacturing plant of its kind in the world. Another illustration is of the largest Corliss air compressor in the world, operated by the Homestake Mining Co. at Lead, S. D.

Great Lakes compressors are the theme of catalogue E of the Great Lakes Engineering Works of Detroit, which is devoted to setting forth the characteristics of its Great Lakes vertical compound two-stage compressor. The design of this compressor aims particularly at compactness, saving in floor space and foundation, elimination of wear, proper relation of crank and flywheel effort, an improved cooling system and quick access to all parts without disturbance of other parts.

The Keystone Farm Machine Co., York, Pa., publishes a book of "Field Scenes," which deals largely with the Hallock shallow cultivators.

The Ohio Filler & Shield Co., Columbus, O., sends out a booklet on the "Lubrication of Ropes and Gears." It describes this company's wire rope filler and lubricant and its fiber rope shield.

The Laclede Fire Brick Mfg. Co., of St. Louis, sends to its customers a map of that city and a ground plan of the Louisiana Purchase Exposition.

A folder which bears the title "Bouquets" comes from the Bickford Drill & Tool Co., of Cincinnati. It consists of photographic reproductions of letters received from various well-known manufacturing companies telling of their experience with the Bickford drill. To these is added a list of concerns that have installed one or more of these drills within a comparatively recent time.

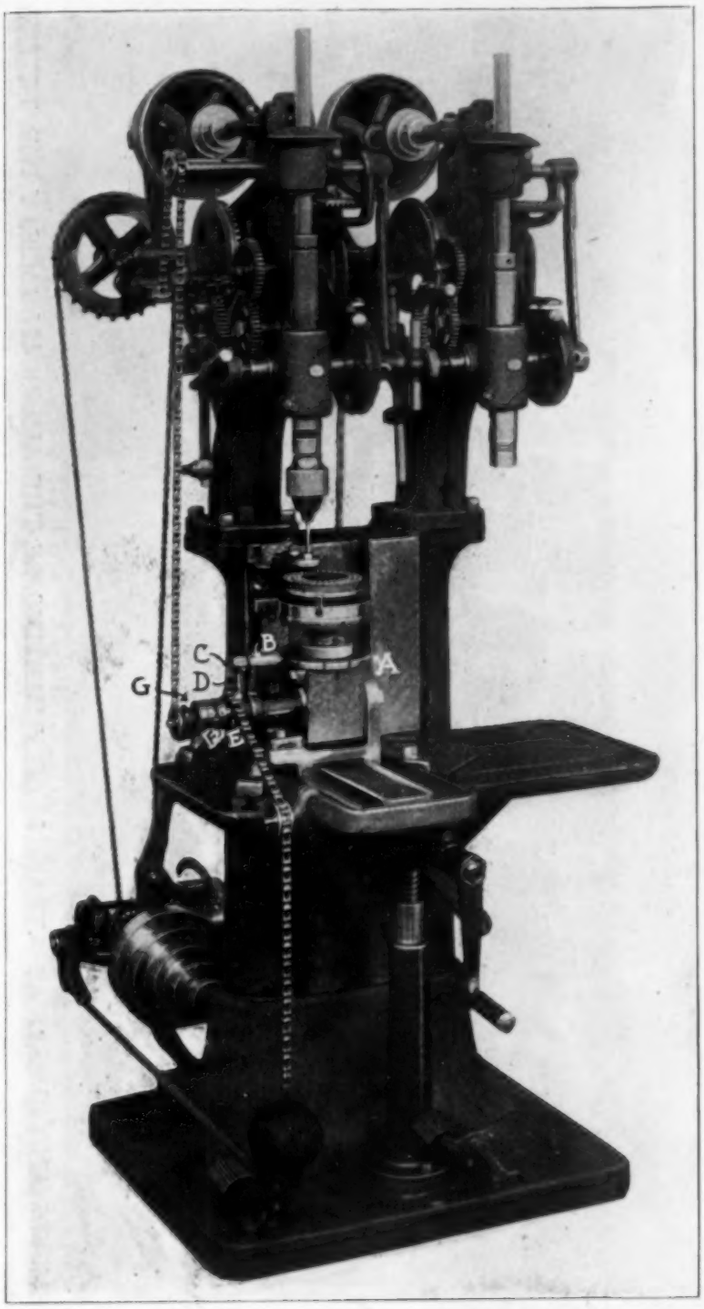
The United Engineering & Foundry Co., of Pittsburg, devotes a new leaflet to its lever shears. For the most part it gives names of metal working concerns using these shears, and adds to the list a number of miniature facsimiles of letters received from users.

A short story of Kristofer Polhem, translated from the Swedish by George Sieurin, is printed by Wyman & Gordon, of Worcester, Mass., and Cleveland, following this firm's recent popular series of short stories of engineers. A leaf or two in addition tells of the Wyman & Gordon crank forgings and of the results of the makers' special heat treatment.

NEW AUTOMATIC REVOLVING CHUCK.

A recent product of the B. F. Barnes Co., of Rockford, Ill., is the automatic revolving chuck shown in the illustration as attached to one of the spindles of this company's two-spindle 14-inch manufacturers' gang drill. It is adapted to be used also on the self-operating spindles of the Barnes 20-inch drills. The half-tone gives a close side view of the drilling machine as equipped with the revolving chuck.

The spindles are independent, being driven from quarter-turn countershafts. A chain running from the lower cone shaft to the upper sprocket wheel operates the spindle by



NEW AUTOMATIC REVOLVING CHUCK ATTACHED TO ONE SPINDLE OF 14-IN. DRILL.

means of a friction against the upper sprocket. On the other end of the friction shaft is a pinion engaging a large gear on the side of the machine. To this gear is attached a vertical bar having adjustable stops which by means of a segment gear regulate the depth or travel of the spindle. Small gears operate the throw-out or automatic stop and as soon as the feed is thrown out the spindle immediately backs out or returns by means of the segment gear. A cam mechanism on the side of the spindle opposite the large gear mentioned throws in the feed at the moment the spindle has descended to the work. In this cam are two stop pins, one of which causes the spindle when backed or raised up to stop until the operator trips it by means of a lever in front of the spindle. However, when using this machine with the automatic revolving chuck the stop in question is removed so that the spindle instead of stopping upon the return will immediately drop down to the work again, drill through or to the required depth at the proper speed, then quickly return and so on keeping up a continuous performance.

The chain which operates the automatic chuck is attached to the large gear which operates the spindle and as this gear revolves, backing up the spindle, the weight on the other end of the chain takes up the slack and when the crank pin on the gear goes down it pulls the chain over the sprocket on the horizontal shaft of the chuck and by means of a lug on this sprocket the plunger disengages from the notch in the notched or spaced plate and as soon as this takes place the friction at the front end of the horizontal shaft, by means of mitre gears, turns the notched plate to the next notch, when the plunger again engages it by a spring mechanism, thus spacing the work for the next hole very quickly before the spindle again returns. This notched plate governs the distances of the holes. The notches may be cut equidistant or at unequal distances as desired, provided that no two of them are more than one-half circle apart.

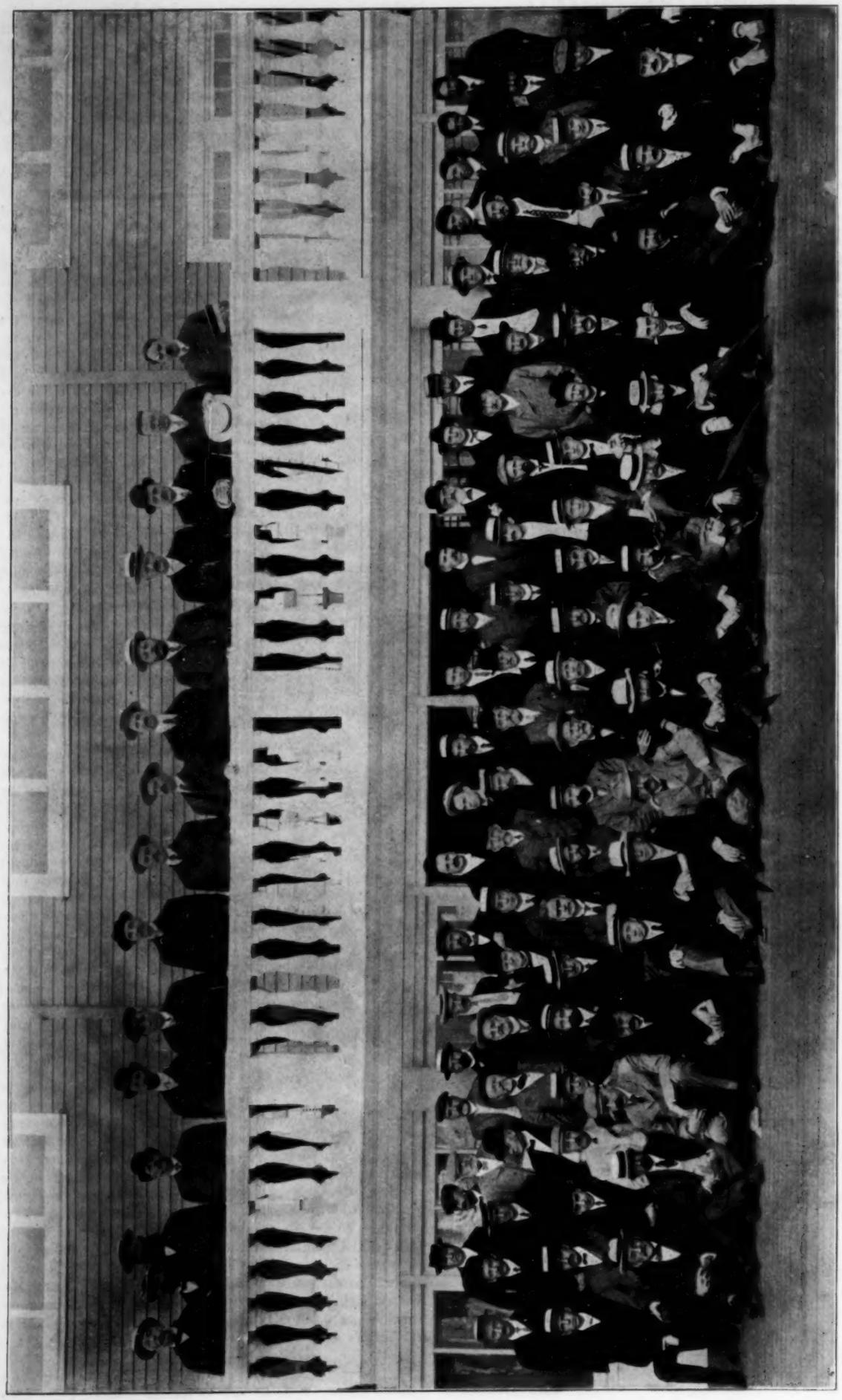
Above this plate on the vertical shaft of the chuck is mounted an ordinary three jaw chuck for holding the work, and it is obvious that by changing the size and style of this chuck the machine may be used for a wide variety of work; that is, it would not necessarily be used for drilling holes in single pieces but by using a special chuck or jig a great many separate small parts could be set in a circle and drilled just as well. Reaming and countersinking can also be done to advantage as well as other classes of work, depending upon the kind of tool used. There is an adjustable guide for the small twist drill or other tool that might be employed.

In the accompanying cut A is the notched or spaced plate; B is the case within which are the plunger and spring. C is the lug attached to the plunger and D the lug attached to the sprocket. E is the sprocket, F the friction and G the spring. The lugs pass by in the revolution of the sprocket and being beveled the one attached to the plunger is pulled outward by the one on the sprocket, thus disengaging the plunger from the notch.

It is possible also to equip the spindles of these drills with the Barnes auxiliary spindle attachment and apply it to some classes of work for drilling two or more holes at a time in connection with the automatic revolving chuck. On a six-spindle machine it has been possible to drill a gas stove burner cap which has six rows of holes, 11 holes in a row, every minute, one row of the holes being drilled at an angle. This output can be doubled by using the auxiliary spindle attachment.

Opposition to the confirmation of Charles Hudson, a director, as permanent receiver of the Omega Steel Co. of New Haven, Conn., developed at a hearing before Judge Wheeler in the Superior Court June 15. Two small creditors made objection, while the Niles-Bement-Pond Co., of New York, the second largest creditor, took a neutral position, and another creditor, through attorneys, favored Mr. Hudson. The company had a capital of $2,500,000, of which amount $30,000 had been paid in. The debts are $10,000. Mr. Hudson claims there was gross mismanagement of the company. The opposition to Mr. Hudson was withdrawn June 16 and he was made permanent receiver.

The Lebanon Chain Works, Lebanon, Pa., have received a contract amounting to $75,000 to furnish chains for the navy department.



GROUP OF MEMBERS AND GUESTS AT ATLANTIC CITY MEETING OF THE AMERICAN SOCIETY FOR TESTING MATERIALS.

Atlantic City Meeting of the American Society for Testing Materials, June 16-18.

The seventh annual meeting of the American Society for Testing Materials was held at Atlantic City, June 16, 17 and 18. It was the most successful meeting in the short career of this important organization, both in attendance and volume of business and discussions. The membership has grown during the year from 349 to 500, and the gain in two years has been nearly 200 percent, the membership in 1902 being 175. The growth of this body has been marvelous, and the interest taken in its transactions augurs well for still greater things in the future. The attendance was larger than at any previous meeting, 150 having registered.

The decision to secure American standard specifications for iron and steel that will receive the indorsement of the leading kindred societies and which will be representative of American practice, was by far the most important action taken. The question of revising the present standard specifications as proposed by committees of some other societies, and in part adopted by them brought about an animated discussion, some of the members having opposed any change in the specifications. The entire matter was again referred back to the committee with instructions to confer with similar committees of other societies for the purpose of endeavoring to secure a uniform American standard, to get the opinions of the members of this society on the proposed changes, and to have all the matter pertaining to this subject ready in printed form to be presented at the next annual meeting. In England standard sections for rolled iron and steel have already been adopted by the co-operation of five of the leading technical societies, and it is not too much to expect that eventually on the completion of the reports of the English committee, the results of their work and of the American technical societies may be harmonized, provided that the American specifications have the endorsement in their present or modified form of the leading kindred societies, so that they may be recognized as truly representative American specifications.

FIRST SESSION.

The meeting opened at the Hotel Traymore on Thursday afternoon, June 16. The report of the executive committee showed an increase in the membership from 349 to 485 during the year, and since the compilation of this report the membership has been increased to 500. The list of technical committees was increased during the year until the present number is eleven. The new committees appointed were: H, on standard tests for road materials; I, on steel concrete; J, on corrosion of metals, and K, on standard tests for boilers. In order that the society may become self sustaining as far as possible, the executive committee proposed an increase in the annual membership dues from $3 to $5. This was favorably acted upon and will be submitted to the members for a ballot vote. The relations with the International Association for Testing Materials during the year were limited practically to routine correspondence. The next congress of the International Association which was to have been held at St. Petersburg this year, has been postponed until 1905, on account of the Russo-Japanese war. During the past four years the American society has remitted $1,916.50 to the International Association for which practically no returns were received. The American membership is now far ahead of the membership in any other country, and the remittances to the International Association are now at the rate of $700 per annum. The International Association has abandoned the plan of establishing an international sidero-chemical laboratory, and the American subscribers to the fund agreed to donate these subscriptions to the treasury of the society. No action was taken with reference to a change of relations with the International Society and the present affiliation will be continued for another year.

Preservative Coatings for Iron and Steel.

The report of Committee E on preservative coatings for iron and steel was next presented. On account of the wide difference of conditions and requirements demanded of preservative coatings, the committee presented in pamphlet form the individual opinions of its members relative to the best methods of testing preservative coatings.

The chairman, S. S. Voorhees, prefaced these separate statements with this comment:

"This compilation of the suggested methods is to be distributed among the paint consumers and producers and engineers, and also through the columns of the engineering and technical press. It is the earnest wish of the committee that these methods receive the thoughtful criticism of engineers and paint manufacturers, as well as the members of the committee itself; for it is only by the hearty co-operation of all interested in this important matter, the protection of iron and steel structures, that rational sets of standard requirements can be evolved to meet the many conditions of service. It is felt that no one set of standard requirements can be imposed on preservative coatings used to protect steel cars, bridge members, structural steel hidden between plaster and expanded metal on one side and brick or stone curtains on the other, and so on through the widely different conditions and requirements demanded in each special case.

"In general, however, the paint film which remains most impervious to water, and is satisfactory in other respects, will probably afford the best protection. In a recent paper on 'Paints for Protection of Structural Work,' [Robert Job in February, 1904. *Journal of the Franklin Institute*] it was shown that, other things being equal, the finer the particles of the pigment the better the protection, thus emphasizing the necessity for thoroughly impervious coatings. A satisfactory test to measure this permeability is of the utmost importance. One method suggested among the following schemes dwells at length on this point, and recommends the use of a film of dextrine beneath the paint coating. On immersion in water, if the paint be pervious the dextrine film will be dissolved and the paint will peel. It is possible that the suggested electric insulating values of the same film, tested when dry, and after soaking in some electrolyte, as sodium chloride, may afford a measure of the absorption of water. The coating, however, must be impermeable, not only when first applied, but also after exposure. This brings up the vexed question of accelerated tests. These tests aim to give in a short time results comparable to actual service.

"The protection afforded by cement coatings, though of recent introduction and limited application, seems worthy of further investigation. At present this coating requires a moist atmosphere while setting, a condition hard to meet in practice. Its action apparently depends not so much on impenetrability to moisture as on the neutralization of carbon dioxide and acid gases, etc. This action is so different from oil paint films that a comparison of these two types of coatings will be difficult. The Committee hopes that this phase of the question will be thoroughly discussed. Criticism and discussion should be sent to Joseph F. Walker, Bridgeport, Pennsylvania, the secretary of this committee."

The report presents proposed methods from W. A. Aiken, International Acheson Graphite Co., Robert Job, Malcolm McNaughton for the Joseph Dixon Crucible Co., W. A. Polk for the Patterson-Sargent Co., A. H. Sabin, G. W. Thompson, J. F. Walker, M. H. Wickhorst, and C. T. Davies for the A. Wilhelm Co.

Previously announced papers on "The Protection of Structural Steel," by C. L. Norton, and on "Preservative Coatings for Iron and Steel," by Cyril de Wyrall were not presented. Robert Job presented a paper on the results of an investigation concerning "Causes of Durability of Paints for Structural Work." The paper as well as the reports of the individual members of the committees were discussed at length. Dr. C. B. Dudley, in speaking of the importance of this subject said that the Pennsylvania Railroad Co. has $35,000,000

(Continued on Page 59.)

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JUNE 23, 1904

A CHANGE IN SHOP CONDITIONS.

Indications appear in a number of directions that manufacturers are making progress toward regaining a measure of control of their business. What were regarded as arbitrary and unjust demands of the unions, when they were made, but nevertheless acquiesced in because business was too pressing to allow any time for argument or parley, are coming in for readjustment, for there is plenty of time now to discuss all questions of shop policy on their merits. What were heralded by union leaders as victories for principles now appear in their real light. They were really surrenders of principle—concessions to necessity.

The situation is not one of employers taking advantage of a change in business conditions to force reductions in wages and onerous shop conditions. Wage reductions have been relatively small. In some cases they have not been insisted upon. What has come is chiefly the dropping of inefficient men, and the employment at the minimum wage rate mentioned in agreements with unions, of men who in recent years have been earning advances above the minimum. The wage changes can scarcely be considered in the light of readjustments.

But there has been a change—and a pronounced one, in many cases—in respect to shop practice and discipline. The direction of work and the selection of men and tools for the doing of the work are again largely in the hands of the employer. In the metal-working trades the rule of one man, and he a machinist, to one machine is giving way to such an arrangement of work as employs handy men where they can well be used, without the slightest impairment of the product. Piece work is being introduced where the edict of the union had banished it, and artificial restriction of output is no longer tolerated. The intolerable stand of the union for the closed shop is being combatted with an energy that promises the ultimate annihilation of this most vicious of all union "principles." Public opinion is setting in strongly in favor of free shops and free workmen, and the agitation on this subject will go on, whether times be good or bad. Everywhere employers' associations are pressing the contest in a way that must bring a permanent, and not a transient, check to the demands of a spurious unionism. What needs to be borne in mind is that the more closely present labor disputes, and those that will be dealt with in the near future, are settled on a basis that appeals to enlightened public sentiment, and does not depend upon opportunity to carry a point, the more permanent will be the conditions manufacturers are now establishing. The public has changed its attitude toward union abuses in the past two years, and will not again look with complacency on some things that have been considered matters of course in the late carnival of rule by shop committee and walking delegate.

SHEET AND TIN PLATE LABOR QUESTIONS.

A crisis impends in the affairs of the sheet and tin plate branch of the Amalgamated Association of Iron, Steel and Tin Workers. Since the tin plate and sheet scales were signed last summer the association has been forced to the substantially unprecedented action of making general reductions in base wages during a scale year, first in the case of sheet wages only, and later in both sheet and tin plate wages. These concessions were not made in a spirit of broad minded recognition of changed commercial conditions in the crafts involved. The first was made because the association had involved itself in some kind of a verbal commitment with certain independent sheet manufacturers regarding the limit of output and because wages were being reduced in the mills which the association had lost through its ill-advised struggle in 1901; the second was made because the association's own members had countenanced irregularities in independent mills which enabled the leading interest to force through almost any claim it chose. The association has been a shuttlecock between the leading interest and the independents for a year and its feathers have become badly ruffled.

It was not in right or justice that the Amalgamated Association should gain any permanent benefit from the strike of 1901. Had the result of that contest been the exact opposite of what it was, evil would nevertheless have followed by this time. As it was, the form is different but the substance the same. Of the leading interest's sheet plants, a handful, and those the less important, were left union, while of its tin plate plants an important proportion became non-union. It was an incident of commercial conditions, by which the workers' association profited, that the independent works, operated so profitably in the summer of 1901, easily remained union for some time thereafter, while new independent plants dropped into the union ranks.

It has long been obvious that the struggle between union and non-union sheet and tin plate mills would be precipitated at a time when the Amalgamated Association would be in no condition to prosecute a contest. The temporary bridging of the difficulty during the past scale year has served only to uncover fully the absence of loyalty on the part of the rank and file to scale obligations and official jurisdiction, and to stir up bitterness throughout the organization.

All this is the fault of the men, but they will also have to suffer through a situation which is in no wise

their fault. When the consolidations were formed there was a disposition to exclude from the wage scale conferences the independents, who were then neither strong nor numerous. There are now many independents but they are still excluded, and this year the important question is whether they would sign a scale in case one should be agreed to by the leading interest. It is extremely probable that they would not without a contest, but the uncertainty as to their disposition in the premises, and their ability to carry out a determination to run non-union, will be one of several incentives to the leading interest to prolong the scale negotiations which have been inaugurated this week. Such a prolongation may act to settle the question which gives rise to it. The sheet and tin plate workers prefer the employment of independent mills to that of the steel corporation, if the latter places them in the mills which are closed, frequently without warning, for long periods. There may be less steady work in an independent mill compared with a combine mill when it is running, but the better distribution of the work over the whole year is an advantage which may sometimes be measured in dollars and cents. Other considerations of importance are involved, all making up to the general point that the independents are better able to obtain concessions from the men through personal negotiation than can the leading interest. The latter can wage a stronger fight on occasion, but the present is a time for conciliation, not fighting.

The scale of 1903-4 was signed by 26 independent sheet and tin plate manufacturers, of whom six made tin plate only, 18 made sheets only and two made both. Of mills east of the mountains there were but two of importance, one making sheets and the other tin plates, that did not sign. The unionism of some of the signers has already been so disturbed and the advantage of operating under union auspices has been so reduced with all that it is extremely probable that many at least will not sign the scale again. The Steel Corporation's interests are particularly conflicting. It has an issue with the men on the matter of base wages, increments on the sliding scale and footnotes, besides all of which there is the important difference that the men wish to abrogate totally the rebate tin plate wage arrangement made in October, 1902, while the corporation would undoubtedly prefer to have its scope extended to include ordinary export plates. With these obstacles in the way of a settlement, the corporation would still prefer to make some settlement which would give the workers' organization enough strength to maintain its hold upon the independents. It seems perfectly clear that it is vastly less disadvantageous to the corporation to have a workers' organization than it is to the independents, but such organization can hardly be maintained longer without joint conferences in which the workers shall meet the Steel Corporation and the independents together, and the corporation long ago made this a practical impossibility. The harvest will probably be reaped this year in the disunionizing of substantially all the important sheet and tin plate plants.

Furnace No. 3 of the Ohio plant of the Carnegie Steel Co., Youngstown, O., was banked last week. The two stacks now in operation at this plant are furnishing sufficient iron to keep the steel plant supplied.

The Labor Situation.

ST. LOUIS FOUNDERS AND MOLDERS DISAGREE.

All efforts to arrange an agreement for the coming year between the St. Louis Founders' Association and the Iron Molders' Union, representing both molders and coremakers, have failed and conference relations between the two organizations are now suspended. This is the outcome of a national conference held on Saturday, June 11, which was called in view of the failure of the local organizations of founders and molders to reach an understanding. The final local conference was held on May 16. At that time every proposal of the foundrymen was rejected. Resolutions had been introduced providing, respectively that "any agreement that may be entered into shall embody the provision for no limitation of production;" that "any agreement that may be entered into between the St. Louis Founders' Association and the iron molders and coremakers' unions shall provide for the open shop;" that "any agreement that may be entered into between the two organizations shall provide for piece or premium work whenever or wherever desired by the employers." All these resolutions were put to vote and lost by a tie in each case.

The next step was the holding of a national conference under the New York agreement. This convened on June 11, the National Founders' Association being represented by Antonio C. Passano, of Detroit, J. W. Gardner, of Quincy, Ill., and Ferd C. Schwedtman, of St. Louis. The molders were represented by Messrs. Frey, O'Keef and Murtaugh. Mr. Pessano explained the position of the National Founders' Association, which was that after a national conference called under the New York agreement adjourns finally without settling the matter for which it is called, the New York agreement becomes void in the particular district or city affected, and thereafter it cannot be put in force there except be special understanding between the two parties.

Some discussion followed as to the agreement of last year for St. Louis. It was explained by Mr. Schwedtman that while the St. Louis founders have always insisted on their freedom to run open shops and to use the piece work system whenever they desired to do so, those provisions did not appear in the formal agreements with the molders since the latter would not sign a contract so providing, and it has been the policy to leave out of the agreements all matters on which mutually satisfactory arrangements could not be made.

Thereupon the founders' committee, after urging the uniform agreement recently promulgated by the N. F. A. (providing for differentials in wages, permitting piece work, forbidding limitation on output, etc.), offered the following resolution:

"This conference agrees to accept the provisions of the uniform agreement presented by the foundrymen. The basic wage rate in St. Louis for molders for the ensuing year shall be $3 per day and for coremakers $2.70. The working hours in St. Louis foundries to remain the same as provided in last year's agreement. The differentials below the above rate to be agreed upon by a special committe consisting of three local foundrymen and three local molders. When this committee agrees on a differential for each foundry the members of this conference shall re-convene and enter into a written agreement covering all the foregoing."

This was lost by a tie vote, all the molders voting no. Mr. Frey stated before the vote was taken that there would be less objection locally to the clause providing for a differential in molders' wage than there would be to such a clause in a national agreement.

A resolution introduced by the molders providing for the continuance of the agreement of the preceding year was likewise lost by a tie vote and the conference adjourned. It is now the determination of the foundrymen of St. Louis to put in force the provisions of the uniform agreement prepared by the N. F. A.

VICTORY FOR THE OPEN SHOP.

Complete victory has crowned the fight which the Chicago Brass Manufacturers' Association has been making for the open shop. After a struggle lasting more than three months, all the unionists involved in the brassworkers' craft have been subdued and have returned to work on the terms of the em-

ployers. The strike was inaugurated by the Chandelier Workers' Union and spread to the other brass workers. The molders went out in sympathy with the Chandelier Workers and before they were in the strife long, the chandelier workers were routed and deserted their cause, leaving the union brass molders to bear the brunt of the fight. With a depleted treasury the union molders were unable to hold out long, as the manufacturers filled their places with non-union workmen, and gradually, as the strike benefits gave out, the unionists returned to work on the terms of the employers. The chandelier workers came out of the strike with their union totally disrupted and the molders are said to be little better off. As most of the places of the strikers have been filled with non-union workers or deserters from the union, but few of the old employes will be able to get their places.

CONFERENCE ON SHEET AND TIN PLATE SCALES.

The conference on the sheet and tin plate scales, between the Amalgamated Association and the American Sheet & Tin Plate Co., opened in the Frick building, Pittsburg, on Tuesday, June 21. The indications are that the conference will be protracted, as the views of the manufacturers and the workers differ widely. The independent manufacturers are not represented at this meeting, and the indications are that they will break with the association on July 1, when the present scale expires.

MAY BE A GENERAL MACHINISTS' STRIKE.

Members of the International Association of Machinists are casting a referendum vote upon the question of enforcing an article of the constitution which, if decided in the affirmative, will bring about a strike on July 1, which will throw thousands of machinists out of work. The article was originally adopted Aug. 1, 1903, and provides that no member of the association shall operate more than one machine or by the piece premium merit task or contract system under penalty of expulsion, and that in shops where such systems are in operation, they must be discontinued by July 1, next.

NON-UNION MEN BRUTALLY BEATEN.

A dastardly assault was made on non-union structural iron workers by union workmen in Cleveland on the evening of June 16. Work was recently commenced by the Forest City Steel & Iron Co. on the superstructure of the Rockefeller block, a sixteen-story building, and non-union men were employed on the structural work. Several attacks on these workmen have been made and on Thursday evening, while eight of them were passing over the Superior street viaduct, they were attacked by a mob of about thirty union men. The non-union men were compelled to defend themselves and fired about fifty shots. Two of the attacking party were seriously wounded and a number of the non-union men were brutally beaten. The non-union men were arrested, as were also a number of the attacking unionists, although a number of the latter escaped before they could be caught by the police.

"CITIZENS' INDUSTRIAL EXPONENT."

As part of the work of the St. Louis Citizens' Industrial Association, of which he is secretary, Ferd C. Schwedtman has begun the publication of the *Citizens' Industrial Exponent*, the first number of which contains 16 pages, 9½ x 13½ inches, bristling with live and vigorous editorial and contributed articles relating to the work of the association. The organization has made good progress in St. Louis. Mr. Schwedtman is also president of the St. Louis Foundrymen's Association and is connected with the St. Louis Metal Trades Association. He is president of the Magnetite Foundry Co., consulting engineer for the Wagner Electric Mfg. Co., and a partner in the firm of Ruebel-Schwedtman-Wells, consulting electrical and mechanical engineers.

REDUCTION IN PITTSBURG FOUNDRIES.

The foundrymen affiliated with the Manufacturers' Association, of Pittsburg, have notified the molders and coremakers in their employ that on and after July 15 they will demand a reduction of 30 cents per journeyman molder and coremaker per day, also reserving the right to reduce individual molders to $3 per day at the expiration of the present contract on July 1. The foundrymen held a conference with the molders last week, but no agreement was reached. An attempt will be made to adjust the dispute on Tuesday, June 28, when a conference between the national officers of the union and the special commissioner of the National Founders' Association will be held at Pittsburg. The machinists' scale is also to be readjusted shortly.

NATIONAL METAL TRADES ASSOCIATION.

CINCINNATI, June 21.—The Cincinnati Metal Trades Association will hold its regular foremen's meeting at the association rooms on Thursday evening, June 23. Several papers will be read and a light luncheon will be spread. These foremen's meetings are instructive and profitable and are now a recognized institution in a number of cities. The papers read and discussed deal with questions of shop practice and shop management. The results have been to make men better foremen, better producers and better handlers of men.

In St. Louis over 200 applications for employment were received at the labor bureau office last week, while only a few vacancies occurred. On June 13, 150 men and boys employed in the wire department of the Leschen Rope Co. demanded a 10 percent increase in wages, and struck on the refusal of the employers to grant the request. A recently formed labor union is the explanation of the strike, which was quickly broken, all places being filled in a few days.

Pittsburg, Boston and Worcester report but little improvement in industrial conditions.

In New York the boilermakers' strike still continues, although the shops of the New York Metal Trades Association members are being gradually filled with a better class of boilermakers than they ever had. Picketing still continues, and two boilermakers were the victims of assault on Thursday of last week. The members of the association have decided that there shall be no retreat from their stand for the open shop, and that there shall be no further negotiations with the strikers. Some trouble has been experienced with some of the foremen who have been either union men or in active sympathy with the strikers.

In Baltimore, John P. Adt, a member of the N. M. T. A., with the assistance of the N. M. T. A., the Baltimore Metal Trades Association and the Anti-Boycott Association on June 13 obtained an injunction against the machinists' brewery engineers and steam fitters' union and the Baltimore Federation of Labor and others. The injunction prohibits the above mentioned organizations from carrying into effect a boycott against the business of John P. Adt. The defendants are enjoined from interfering with or hindering him in conducting his business by following delivery wagons on the streets for the purpose of finding where work is to be done, or from going to or sending any communications to customers for the purpose of inducing, persuading or compelling by threats or intimidation such customers to withhold work they might otherwise give to said John P. Adt, or compel him to stop work ordered from him, from publishing anything that would tend to discredit or injure his business or the business of any person said John P. Adt may do work for. This injunction is the first ever issued in Maryland for such purposes and will no doubt establish a precedent for similar decisions.

In regard to the Chicago strike, it is stated that the members of the N. M. T. A. all over the country are quietly and effectively picking up good men and sending them to Chicago to the relief of their fellow members suffering from the strike. Men are being effectively taken care of, and as fast as any trouble develops an injunction is taken out by the Chicago Employers' Association in behalf of the shop in trouble. Eight of such injunctions have been granted up to date. Secretary Wuest still continues in charge of affairs on the ground. He has organized foremen's meetings at frequent intervals, and as a result of the education received therein a number of the foremen have realized that they could not serve the union and the employers at the same time, and have given up their union cards. Some of the thoroughly disaffected foremen have been replaced by the men furnished by the N. M. T. A. The quantity of work turned out by the new men is much greater than turned out by the union men, owing to the decided restriction

caused by the union rules. In one instance eight high-priced boring mill hands have been replaced with one good mechanic who sets up the work and starts the cuts, and eight handy men who watch the tools run and stop the machines until the machine setter can give them attention. Not only is the aggregate wage less in this method, but the production is considerably more than it was formerly.

LABOR NOTES.

According to an agreement recommended by the State Board of Arbitration, the working contracts of all foundries of Belleville, Ill., for the year 1903 are to be in force until May 1, 1905, and there shall be no changes unless thirty days' notice has been given. Members of the union are to be given preference.

The shops of the Allis-Chalmers Co. at Chicago will be closed all of Saturday each week until business improves. The employes have expressed their satisfaction with the arrangement.

Because the firm refused to reduce the number of working hours from ten to nine, members of the Structural Iron and Wire Workers' Union employed by Hackendahl & Schmidt, Milwaukee, went on a strike. The employes of C. Coinik, of that city, have also refused to work.

The bridge and structural iron workers of New Orleans who belong to the union have gone on a strike. Employers state that they are not seriously inconvenienced by the strike.

John McNeill, president of the Boilermakers' and Iron Shipbuilders' Union, has disavowed the present strike of the boilermakers on the Illinois Central. In a message to the Illinois Central Officials he states that he does not approve the action of the men and will not uphold them. The strike is believed to have been inaugurated by irresponsible parties and will probably be called off soon.

The Hanging Rock Iron Co., Hanging Rock, O., has offered a reward of $500 for information leading to the arrest and conviction of the party or parties who shot its superintendent, W. M. Jeffreys, May 31, during the riot caused by the strikers and their sympathizers. The strike has not yet been declared off and further trouble is feared.

The sheet iron and metal workers of Logansport, Ind., after being out on strike for two months, have given up the fight and returned to work.

The executive board of the Elevator Constructors' International Union, at a meeting in New York, June 17, ordered a general strike against the Otis Elevator Co. Notifications were sent to all the local unions in New York, Boston, Philadelphia, Chicago, Pittsburg, Cleveland, New Orleans, Baltimore, Washington, San Francisco, St. Louis, Milwaukee, Kansas City, St. Paul, Minneapolis, Omaha, Buffalo, Rochester, Montreal and Toronto. The union claims that it controls 7,000 men. The strike is a sympathetic one in support of the local unions in Boston and Philadelphia, which have been on strike for seven weeks. The Philadelphia Union demanded an increase in wages from $3.50 to $4.25 a day, which was refused.

The Illinois Central railroad has come to an agreement with its machinists for the next year. The machinists asked for an increase in wages and several minor changes in the contract. The increase was refused, but some small concessions were granted.

A conference was held last week by representatives of the Molders' International Union and the Manufacturers' Association of Pittsburg. The molders' representatives demanded a renewal of last year's scale, but the manufacturers insisted upon a reduction of 10 percent. The meeting adjourned with a disagreement. Further meetings will probably be held.

Sixty-five union machinists employed at the plant of E. Goldman & Co. in Chicago, have joined the army of unemployed unionists. The machinists now admit they have 2,000 members idle. The employes of the Goldman plant had been working under the old conditions and when it was learned that the company would enforce the conditions under which the Chicago Metal Trades' Association members are running their shops a strike was ordered.

The Amalgamated Association conference with the officials of the Carnegie Steel Co. on the iron scale for the ensuing year was held in Pittsburg last Friday and Saturday. No agreement was reached, inasmuch as the company is demanding a material decrease for next year from the existing scale. No date was set for holding a future conference. The arrangement with the Republic Iron & Steel Co. is that in case no agreement is reached by July 1, the entire wage matter will be left to a board of arbitration, the manufacturers to select one, the association the second and the two principals to agree upon the third. Both sides are to abide by the decision of this board.

The structural iron workers employed on a new bridge of the Boston & Maine railroad, near Portland, Me., who went on strike recently for an 8-hour day, have returned to work under the old conditions.

The puddlers employed by Spang-Chalfant & Co. and Moorehead Bros., Pittsburg, have agreed to accept a reduction of 50 cents a ton. They were receiving $5 a ton, but will hereafter receive only $4.50. The iron mills that employ members of the Amalgamated Association are compelled to pay $5.25 per ton under the terms of the last settlement.

In Cincinnati, Covington and Newport, for several years there has been an agreement between the Foundrymen's Association and the Iron Molders' Unions whereby all questions of hours, wages and shop conditions were adjusted for the year, commencing Aug. 1. Last week the secretary of the Foundrymen's Association notified the unions that after Aug. 1 the business relations between the two organizations would cease.

The shop rules of the St. Louis Metal Trades Association, as printed in our issue of June 2, are being enforced at the shops of members. They provide that there shall be no limitation of output, that shops shall be open to union and non-union men and that the management of the business, the selection of men best fitted to perform the various kinds of work and the determining of conditions under which the work shall be done, shall be in the hands of the employer.

The representatives of the Allis-Chalmers Co. have made the appraisement of the Bullock Electric Mfg. Co.'s plant, of Cincinnati, at $2,716,000. The Allis-Chalmers Co. has also placed $430,000 cash in that city to the credit of the plant for improvements.

Manager Wheelock, of the Anderson Carriage Mfg. Co. states that the consolidation of the Anderson company and the Cincinnati Spring & Axle Co. will be effected, and both plants merged in Anderson, Ind., provided water mains and street car service are extended to the location of the consolidated plants. It is thought the improvements wanted will be made.

The regular monthly meeting of the Nut and Bolt Association was held in New York last week and decided to reaffirm prices. Similar action was taken by the Eastern manufacturers of bar iron.

The Bessemer plant of the American Steel & Wire Co., at Newburg, Cleveland, has been closed and the company is not able to state when it will resume. This plant has been in almost continuous operation for four years and is in need of repairs, which will now be made.

The S. Obermayer Co. of Cincinnati recently shipped to Scott-Oliver Car Co., Knoxville, Tenn., an entire foundry equipment consisting of six carloads, including cupolas, blowers, ladles, tumbling mills, foundry facings and supplies of all kinds. The Scott-Oliver foundry and machine shops are among the largest and best equipped south of the Ohio river.

The Globe Machine & Stamping Co., Cleveland, has acquired the business, merchandise, machinery, etc., of Otto Konigslow, who will be with the company as a stockholder, director and superintendent. The plant will be greatly improved. It will remain at 970-972 Hamilton street.

L. K. Comstock & Co., contracting engineers, have removed to larger quarters in suite 407, 114-118 Liberty street, New York.

APPRENTICES IN THE FOUNDRY.

BY O. P. BRIGGS.

In considering this question of apprentices and how to handle them, let us first put ourselves in a frame of mind to be honest with ourselves. As has been well said, a "self fooled man is the worst fooled man on earth," and certain we are to share this fate unless we can open our eyes and ears with a mind receptive and free to conviction.

I claim that we in the West—possibly not so many in your section—during the past season of prosperity, if not before—have paid too little attention to this very important factor in our shops. Our minds have been occupied with what seemed for the time being of vastly more importance than the welfare of those who were just entering our employ.

Surely the striker, the agitator, the walking delegate, the union demands in general, are enough to occupy all our spare time. When we are crowded with work, these labor difficulties, together with the legitimate demands upon us for an increase in wages, for shorter hours, and all the other conditions to be considered with our employes, are perhaps the excuse for the apprentice boy being overlooked and neglected in the grand rush and turmoil. If so, this is surely a mistake. This same boy, neglected and untrained as he is in many of our shops, is and ought to be in the future the source of supply for our skilled mechanics, journeymen, foremen, superintendents and managers. We may rob each other of our molders, hire our neighbors' machinists, entice away a competent foreman or superintendent, and still the supply and the source of supply remains the same. There is not one more skilled mechanic produced, not one more foreman educated, nor another superintendent brought forth; simply a transfer, nothing more. And while we are thus chasing around in our neighbor's territory for competent help, how many of us are studying our own apprentice boys, attempting to find ability under our own roof with which to supply our own demands?

Let's be honest with ourselves on this point and begin right at the bottom, the very foundation of our supply of mechanics, and ask ourselves a few simple questions:

1. In taking on our boys to learn the trade, what qualifications do we require? Do we ascertain first what sort of boy the applicant is? Do we call for his pedigree? Do we actually know whether his parents are honest, law-abiding citizens or states-prison birds, whose highest aim in life is to be the champion beer guzzler? If we have neglected to so investigate the boy's parentage, then we are dishonest with ourselves, and, instead of investing our efforts profitably in an attempt to produce a good mechanic, we are worse than throwing our energy away by producing a most competent walking delegate to annoy us.

2. When considering an applicant, do we require an educational qualification? Do you believe you can produce as good a molder from a boy who cannot read or write as you can from a boy who has not only these qualifications, but who has a mind so far developed as to do his own thinking in general, instead of depending upon his neighbor, the agitator, to furnish the brains for him. Well-bred, honest boys, with honest, law-abiding parents, are to be found all over this broad land who would like to learn the molder's trade. It only requires competent, careful search, and the best stock on the globe is to be found right here in the United States.

Are we fair to ourselves, and do we take advantage of opportunity, the very watchword of success, if we apply our energy, our instruction and our money to poor stock, to boys undesirable from the very start, when a little extra effort, a little more care and thought on the subject, will find us the very stock we are in need of?

With all our care and caution in supplying the best quality of materials with which to operate our foundry; with all our caution in selecting bookkeepers who are honest, faithful, trustworthy and loyal employes, how many of us have really considered seriously the importance of procuring good stock out of which to make our mechanics? How many of us actually know how much money we are losing by wasting our efforts on poor stock of apprentices, when, if the proper character and ability were at hand, they would be a source of profit even at the start.

Attitude of Foremen.

It is a well known fact that too many foundry foremen have no patience with or interest in the boys. Where such foremen are found, they should be properly looked after by the proprietors. Our foremen should be taught the necessity of getting results from these boys for every reason you can name. First—Because we want the investment to be a paying one; second, the foreman's interest demands that the investment must be profitable if he would retain his job; third, every citizen of the United States, proprietor or foreman, should take a great pride in the product of his shop. His output of good, competent, reliable, law-abiding mechanics should be a source of as much pleasure with him as the pride he takes in producing a good casting. The casting will never be produced unless some one has first produced the mechanic competent to make it.

In cases where six or more boys are employed in foundries doing a high class of work, no better investment can be made than to provide them with a special instructor to devote the time necessary to advance them as rapidly as possible. In what corner of your foundry can you make money more rapidly than where a bright apprentice boy in his second year is producing the same quality and quantity of work as his journeyman neighbor is producing at from $2.75 to $3.75 per day? The sooner we advance these boys to a good class of work the more money we make and the better pleased are the boys. Nothing encourages the boy to greater effort so much as advancing him upon well earned merit. Suppose he does lose a few castings at the start, if he is the proper kind of a boy, if he is of the stock worthy of a place in our shops, with fair instruction, he won't lose the second casting off the same pattern.

I dare say not one-half of the employers of this country ever consider it personally necessary to give their foremen positive and emphatic instructions in regard to his duty to the apprentice boys or know how any molder apprentice in his employ is progressing. I believe it the duty every foundryman owes to his trade, his family and his country to select and educate with the greatest care a reasonable number of apprentices, emulating to some extent the employers of a hundred years ago. The apprentice of that age was a part of the master's family, worked by his side, ate at his table, sat in the same pew, and when he went out into the world, he went the same as a son, a competent mechanic, a law-abiding and often an able law-making citizen, with a new suit of clothes, $16 and an education—in the language of the Indiana statute—up to and including the rule of three.

The law of to-day, as it appears on the statute books of most of the States, places the employer in much the same relation to the apprentice as the father to the son. Is there a law in our land nearer a dead letter? In fact, none of us would care to comply rigidly with these laws as they now stand. There seems to be an opportunity for some of our distinguished statesmen to try their hand at legislation that would be general and uniform throughout the country and which would protect employe and employer alike.

Qualifications of Boys.

In carrying into practice this plain and simple duty, as it appears to me, over and above all other consideration lies the task of selecting the boy. In making this selection, we want:

First—A boy who comes from a law-abiding, respectable family of good citizens, who are deeply interested themselves, as good parents always are, in the welfare of their children.

Second—We want a boy of character, with a keen sense of honor and honesty.

Third—We want a boy who is by nature mechanical.

Fourth—We want a boy whose ideals are up and not down.

Fifth—We want a boy with a fair, common school education, whose mind has already been developed to such an extent that he can do his own thinking.

Don't say such boys are not to be found. They are with us by the thousand and at our disposal if we will but apply ourselves to the task of finding them and training them with the same degree of zeal and energy that we give to other branches of our business.

*Read before the June meeting (1904) of the New England Foundrymen's Association at Boston. Mr. Briggs is commissioner of the National Founders' Association.

In my judgment the proprietor is false to his own trade, his own family and his country, who will allow a boy of bad character, of anarchistic principles, of disloyal nature, or without mechanical ability to enter his employ as an apprentice, much less to graduate as a journeyman. Right here lies the key to the whole situation, and this key is in the hand of every employer, regardless of any combination or organization of men known to the trade in this country.

Let us as employers exercise this right to say who shall leave our factory doors clothed with the title and dignity of journeymen. Let us use this means above all others in our effort to raise the standard of the workman and dignify his trade and position in the community as it should be, at the same time dignifying our own calling and standing in the community.

Many notable cases where good results have been obtained from such practice are on record. One of the most important cases I can cite to prove my contention is that of the C. & N. W. railroad, a corporation operating over 8,000 miles of road successfully in the West, as perhaps you all know, especially those who hold its stock or bonds. It has been my pleasure to know many of the officers and employes of this road for 25 years. At the very inception of the enterprise, some 35 years since, when its first short line was built from Elroy to Hudson, Wis., the orders of the president to those employing men to operate the road were emphatic on the quality of those engaged for the work. In the language of a most competent superintendent, who has been in the service of the road continuously for 32 years, "the boss told us to know the breeding of every boy we hired; that we are to build up a corps of men from roustabout to president second to nothing on earth, and the superintendent who failed to obey this rule lost his job in 30 minutes." The result of this practice is most noticeable. The service on this road is as near ideal as that of any corporation you can find, and during its entire existence but one strike has ever occurred, and this was of minor importance. It occurred in Chicago in 1904, when the Debs following was so strong. A few of their men were out a short time on a sympathetic strike. Every man on the road knows that any grievance of the men can have attention immediately, and that if necessary they can appeal to the highest officer of the road for consideration, and that every man in the employ of the road has the same right.

Impressions on the Young Mind.

As the impressions made upon the mind in its youth are more lasting than at any other age, it is of the greatest importance to the employer that the mind of the boy is under the proper influence. The carefully selected boy who is made to feel during his years as an apprentice that he is of some earthly good from his employer's standpoint; that his employer is interested in his welfare to the extent of his receiving a fair opportunity to learn his trade, who knows that his foreman has his interest at heart, can be safely counted on as maturing an honest, loyal journeyman, who will think twice before he joins the ranks of the strikers at the hand of the so-called agitator, or before he performs any act of violence or misconduct against his employer.

In this age of speed, of commercial rush, of financial greed and ambition, where men are employed by thousands instead of hundreds, where the employer's time is more than occupied by the tremendous work of the counting room, it is perhaps little wonder that in too many instances the boys have been forgotten, have been neglected, and, in this way (unintentionally) ill-treated to such an extent that we now find ourselves as employers of high-grade molders so far removed from our workmen that we know little or nothing of the nature, quality, condition and environment of the generation that is rapidly taking the places of those whose sphere of usefulness as journeymen is gone. In no case among mechanics do we find this condition more marked than among our molders.

The Union.

Considering the matter from a union standpoint. Some say that as soon as a boy graduates as a molder, and often before that time, the unions take him in and spoil him; hence the time and effort devoted to his training is wasted. Now I am optimistic enough to believe that should the policy I advocate be pursued by 75 percent of the foundrymen of the country for a period of 10 years, the thinking, reading, competent, law-abiding molders would be so far in the majority that even though a union was maintained, it would be a good union, and its unjust, unreasonable, un-American, uncitizenlike methods would cease to such an extent that the proprietor would have little or no trouble with them. Either this condition would result or the union would disband for want of support.

I contend that if 15 percent of our mechanics in any department—molders, machinists, patternmakers, etc.—had received an education as herein indicated, they would control the entire situation. It is not merely their own vote that counts in a union, but the votes they take with them. These men, who are sifted out until you get high school boys, will take a hand in the deliberations of any organization to which they belong. You cannot stop them, and when tney move they take others with them, while at the same time the union may be composed largely of men of equal mechanical ability, but who have not the ability or courage to take part in union debates. They are, therefore, silent and soon become so muzzled and disgusted that they don't even attend the meetings of the organization. These same men will follow with their votes a few leaders who do have the ability and the courage to make their views known whenever occasion calls for it. We want leaders.

Our Immigration.

The sentimentalist objects to this theory on the ground that if practiced to a large extent, there would be no room for the reform of the many children of bad habits and low parentage. One might consider this argument unassailable were it not for the fact that this great Nation of ours has become to an alarming extent the dumping ground for the ignorant foreigner. If reports as circulated are correct, as I believe they are, last year's immigration to this country was nearly 900,000, of which number 600,000 came from Southern Europe, with just barely education sufficient to be admitted, the vast majority of them being unfit for anything except the most menial kind of work, utterly incapable and unqualified to become skilled mechanics. This vast influx of ignorant people, together with the increase of population of the same character already with us, actually precludes any attempt of the proprietor of to-day undertaking to introduce the charitable feature of employment in the apprentice boy portion of his business. While we are a free, liberty-loving and charitable race, with all this ignorant foreign population forced upon us as rapidly as it is now, the old adage of "charity beginning at home" was never more applicable. We are forcibly reminded of the statement of that great statesman, the Hon. James G. Blaine, in one of his last speeches in Washington upon the immigration question, when he used this language: "The time will soon be here when it will be the duty of this government to shut off all immigration for a period of from ten to twenty years and educate the foreigners we have already with us." I believe this great man's prediction has become true and that it is high time his remedy be applied.

Methods of Raising the Standard.

One great drawback to our success in obtaining young men of high standard for our foundries is the environment of the foundry itself, known as it is to most people as a dingy, dirty, smutty, smoky old place to work in, with poorly lighted and ventilated buildings. No wonder in many cases the best boys do not take as kindly to the trade as to some other calling. It becomes necessary then for us to give all these matters more attention, to devise ways of bettering the conditions of the very places in which we expect our men to perform their daily task. I do not wish to be understood as advocating a rank waste of money in providing expensive buildings, equipped with lavatories, with the latest design of shower baths, individual wash bowls with soap cake, Turkish towels, elaborate dining rooms etc., but I do wish to say that in my judgment it is possible for any foundryman to provide a suitable place for his men to hang their coats and deposit their dinner pails upon entering the shop; that such a place be so arranged as to insure neatness and cleanliness, as well as a suitable place for the workmen to warm their coffee at noon, and a small, well-kept room for them to gather in in cold weather and eat their noon meal in comfort. As an attraction for the best

quality of boys it will be found that a well-lighted shop beats darkness; that a neat and well appointed locker is superior to the peg in any old post for the coat; that a comfortable place for dinner is ahead of the sand pit; that conveniently located, well kept closets surpass the back yard, and that a suitable place to wash up at the shop is more attractive to high grade boys than carrying home the day's accumulation of sand and dirt to perfume the home and vex the family. Any owner and operator of a foundry, I care not how small, can in a great variety of ways improve and perfect these conditions by degrees with a trifling cost, provided he gives his attention to the subject.

Could we improve these conditions of the workmen in our foundries to such an extent that the average boy about to decide upon a trade to follow for life, would look upon the foundry with the same favor and as presenting equal or better conditions and surroundings than the pattern or machine shop, we should find it vastly easier to raise the standard of our molders. Few trades present greater opportunities to the would-be skilled journeyman or foreman from the financial standpoint than the molders' trade, but on account of the very nature and environment of the work, the best boys seek some other calling. Here is the task:

Use every effort to make the trade attractive to the boy and conversely use every effort to get the boy who will become attached to and interested in the trade. If we secure high grade boys for this work and succeed in keeping them, we must see to it that the conditions surrounding them at the very start, the very day they take up their work, are such as to induce them to become enthusiastic in it. The enthusiasm of youth is of inestimable value to every manufacturer who will cause it to be properly directed. It is true that this same principle applies in all lines of employment, but in no case ever called to my attention is the opportunity greater both from the standpoint of the employer and the employed than in our foundries.

In conclusion, I wish to ask you a few questions. Answer them in the operation of your shops.

1. Is not the whole future superstructure of our high grade journeymen molders resting entirely upon our apprentice boys?

2. Will not that future superstructure of molders be good or bad directly in proportion as our apprentice boys are good or bad, and will not these boys graduate good or bad in just such proportion as we the employers allow the good or the bad boy to be clothed with the dignity of journeymen at our hands?

3. Will not these same boys graduate competent or incompetent just in proportion as we, the proprietors, interest ourselves in their welfare, and insist upon their receiving careful and competent instruction as apprentices?

4. Is not the employer's attention to the apprentice boys the important avenue of procedure to logically solve the labor problem with the skilled molders?

5. Assuming the above four questions to be answered in the affirmative, are we, the employers, not to blame to a very great extent for the present unsatisfactory labor condition in our foundries?

MEN REJECT COMPULSORY ARBITRATION AWARD.

The unwillingness of the labor unions to accept the awards under the compulsory arbitration system in New Zealand, when the court finds against them, is a feature of the operation of the plan there that brings it far short of the ideal. Western Australia has had a similar experience, and it is pointedly detailed in the following from London *Engineering*:

"Next to her gold, timber forms Western Australia's most valuable commodity, there being vast areas of virgin forest from which are obtained the Jarrah and Karri woods, now so much used for all purposes where toughness and durability are required, the exports of these woods amounting in recent years to over 500,000l. per annum. But, unfortunately, the forests are for the most part some distance from shipping ports, necessitating considerable capital expenditure for their satisfactory working, and hence the development of the industry has been slow, and the various companies engaged in the trade have not been too successful. Recently, however, an amalgamation took place between several of the largest companies, who merged themselves under the title of Millar's Karri & Jarrh Co., the combine employing, when in full working order, over 3,000 men, which is comparatively a very large number, seeing that the adult male population of the state must be well under 100,000. Since the amalgamation the company have shown increased activity, while their mills have, on the whole, been very well occupied; and seeing this, the Yarloop Timber Industrial Union of Workers, as the men's union is termed, deemed the time opportune to agitate for a higher rate of pay, laying their case before the established court of arbitration. The company, on the other hand, claimed that, in spite of a large turnover, prices were low, with profits small in consequence, so that if any change in wages was to be made, it should be in the downward direction rather than the upward; and they succeeded in bringing such strong evidence in support of their view that the court's verdict was against the workmen, fixing the hours of labor at 52½ per week, instead of the 48 demanded by the men. Further, the court was entitled to fix a minimum rate of wage, and was asked by the union to do so. But in doing this the president of the arbitration court (one of the Puisne judges) laid down the principle that they should determine the lowest wage to be paid to the least competent workman in each branch of the industry, and named a 'minimum wage' some 20 percent below that that the most capable hands had previously been receiving.

"The result of the award, which should have come into force on Dec. 1 last, was ludicrous. The union were indignant at its terms, and, although it was they who had in the first place invoked the court's interference, at once sent a deputation to the company asking them to revert to the *status quo*, and to ignore the court and its award *in toto*. Meanwhile, to strengthen the deputation's hands, something like half the employes left their work, one of the largest mills being thrown entirely idle. The men's great fear is that (as so often predicted) the 'minimum wage' will be regarded by the company as the maximum, and one of the deputation's alternative requests—marvelous that such a request should come from trade unionists—was that the men should be graded, and paid each according to his merits; while a still further suggestion was that the arbitration court's investigation and award should be entirely set aside, and the whole matter submitted to a new board of conciliation, to be chosen from men well versed in the timber trade, on the ground that the court of arbitration—a standing body, consisting of an equal number of representatives of the employers and employed of the state, and presided over by a judge of the supreme court—could not be expected to be competent to probe the intricacies of the timber industry.

"The company naturally replied that they could not understand the position of the men in wishing to do anything but abide loyally by the court's decision; but while maintaining that the old conditions and terms of employment were entirely a matter of the past, they offered a compromise to the extent of advancing the rates of pay to the more competent men to a figure somewhat above the authorized minimum, though lower than had obtained heretofore, and the men's delegates have advised the acceptance of these terms. Indeed, as both the Amalgamated Workers' Association, with which the employes' union is affiliated, and the Parliamentary Labor Party have passed resolutions condemning the men's action in striking against the court's award, there is little left for the men but to submit with the best grace they can muster.

"This case, however, raises an interesting question, which no doubt will come before some court of law ere long—namely, whether, when a legally constituted industrial arbitration court's award is distasteful to one of the parties, an injunction can be obtained to compel that party to abide by the decision. Should the employer object to the verdict, clearly he cannot continue paying less wages than has been declared the minimum; yet an injunction could hardly be maintained against him to prevent him either from closing his works and abandoning his business, or from very materially reducing the number of his hands, and both these alternatives would always be open to him. On the other hand, where the circumstances are those of the Western Australian timber trade, and the men object to the court's award, what is then the legal position? It can hardly be supposed that a court of justice would in any way compel any individual man to resume work at the standardized rate of pay, for, apart entirely from his union, and from the matter in dispute, each man retains his right to leave his employment at an hour's, day's, or week's notice, as the case may be. Yet it is quite conceivable that if, after an appeal to an arbitration court, a trade union declared a general strike, or, without going this far, allotted strike pay to men who left work as a protest, then an action for damages against the union might be successful, provided that the union was one of the actual parties between whom the court was called upon to adjudicate."

PIG IRON WARRANT SYSTEM AND THE FOUNDRY.*

BY GEO. H. HULL.

The proposed letting of a contract for a large amount of castings to be used in connection with the Pennsylvania tunnels in New York, deliverable over a period of four years, has for several months been a topic of much discussion among iron foundrymen, and the would-be contractors have found embarrassment over the question of how to protect themselves in making a bid at a fixed price, and for fixed dates of delivery, over so long a period, in face of the well known irregularities which in the United States attend the supply of pig iron, both as to price and deliveries. With the experience of the last five years fresh in mind, during which iron advanced to $25 per ton, and the stock held by the merchant furnaces was on two occasions reduced to less than 50,000 tons, the idea of making a contract for 300,000 tons of castings with fixed dates of delivery seemed like tempting fate.

If, for example, the furnaceman with whom the foundryman made his contract for pig iron should, for any reason beyond his control, be unable to make or deliver the iron at dates specified, and iron should again be scarce and high, it is impossible to tell how serious the result might be. The custom prevalent among foundrymen in the United States of taking contracts for castings, deliverable on fixed dates, over long periods, and of relying for their materials upon a contract with iron producers, containing what is called the strike or accident clause, reading: "Shipments and deliveries are subject to strikes, accidents, deficient transportation and all other causes beyond our control," seem to the mind of the Scotch foundryman to voluntarily invite disaster. The possibility of a strike in his own works he recognizes as a risk of his own, and one which he cannot avoid, but the idea of doing business on the basis of assuming everybody else's risk, all down the line, he does not comprehend.

If the foundryman allows the strike or accident clause to be inserted in his contract for pig iron, ordinary prudence would prompt him to require in his contract for castings, and so must each one all along the chain of producers and consumers. Through such a custom, anyone may escape the obligation of making deliveries on time, either through a difficulty at his own works or an interruption in the delivery of his raw materials. When such a condition has become general (and we are drifting rapidly toward it), a labor leader in any one branch of the industries may control all the productive industries of the country. A steamship in progress of building, for instance, would progress toward completion only when labor in all the trades which furnished any material for that steamship graciously permitted it to do so. Labor leaders already have power enough, without any such voluntary aid from employers. Fortunately, it is often impossible for the labor leaders in one trade to induce other trades to join in a sympathetic strike, but just to the extent that employers accept this strike or accident clause, they hand themselves over, "bound hand and foot," to the mercies of the labor leaders of every trade which is in any way connected with their own.

But this is not the only evil encouraged by this strike or accident clause. It is probably the most potent means which could possibly be devised for discouraging the accumulation of reserve stocks of raw materials. If the sellers of pig iron, for instance, were not permitted to embody this conditional clause in their contracts, that is, if the consumer would accept only contracts for iron which required positive delivery at times specified, then the sellers, through ordinary prudence, would be forced to carry a reserve stock sufficient to enable them to make deliveries through any ordinary period of interruptions which might take place in their works; and these reserve stocks, if thus accumulated in every branch of manufacture, would not only be a great boon to all the constructive industries of the country, but they would go far toward discouraging labor strikes within these industries.

The Hon. Carroll D. Wright, United States Commissioner of Labor, when he visited New York in the winter of 1903 as the representative of President Roosevelt to investigate the anthracite coal strike, said to an enthusiastic exponent of the reserve stock system, that if the coal operators in the United States had carried out his theory of accumulating large reserve stocks of coal, there would probably have been no strike. In determining whether to strike or not to strike, the labor organization will first consider its chances of success. In whatever branch of production the strike is contemplated success depends largely upon the reserve supply of the product immediately involved. If the stock be small, the necessities of the community go a long way toward forcing the producers to resume work, even to the point of conceding to unreasonable labor demands. On the other hand, if the stock is large, that one fact will almost certainly prevent a strike, unless it is founded on some good and sufficient reason.

In this country, under existing conditions, the only way a foundryman can make a contract for a large amount of castings, deliverable over a long period, and be sure of having the required amount of pig iron when he needs it, is to buy it out and out and pile it in his yard at the time he makes the contract. But this would tie up an unreasonable amount of capital, and occupy too much of the consumer's yard space. The producer, on the other hand, has no incentive to accumulate iron; he may contract his anticipated product for months ahead, deliver it on those contracts as made, and if anything beyond his control prevents his producing it, he is relieved from delivery by the strike or accident clause. He may sell his expected output a year ahead if he chooses, and not be obliged to carry a single ton of stock. What is the result? No one carries any stock which he can avoid, and when each period of prosperity returns to the country the whole fabric of business is hampered, delayed and disorganized by the famine in iron; prices soar to fabulous heights, all other materials follow in sympathy, laborers strike all the way up to get their share of the good times, and afterward, all the way down to ward off their share of the bad times. Eight times within the last eighty years this country has suffered from an iron famine. Everyone who had work which required iron was behind, and the whole business of the country was delayed in consequence of the scarcity of this one article.

If you think I am giving too much importance to iron, remember it is the foundation of all the mechanical industries. Look about you, out of doors or in. Can you see any article of value produced by man which is not fashioned with the aid of iron? The food you eat is cooked in iron utensils; the clothing you wear is woven by iron machinery; it is necessary to every step of man's progress. If you double the mechanical industries, you double the wear and tear of iron and the demand for it. Remove iron, and you paralyze the commerce and industries of the civilized world. Is it too much to say, then, that a famine in its supply, and an advance of 100 percent to 300 percent in its cost will derange and retard the industries of which it is the foundation? There is no other staple which cannot be supplied quickly enough to meet a suddenly increased demand of 100 percent. To meet a corresponding increase in the demand for iron is impossible. It therefore becomes evident that these abnormal and injurious advances can be modified only by producing in dull times a surplus stock as a reserve to supply the demand in active times. It is no more over-production to accumulate during seven or eight years of dullness, enough iron to supply the demand during the succeeding two or three years of activity, than it is to accumulate during the three months of harvest enough grain to supply the demand during the succeeding nine months. It only requires that the mind shall become accustomed to the idea to fully accept it.

For several years previous to 1897 the production of iron in this country was on the plane of about 9,000,000 tons per annum; iron producers were bemoaning what they called over-production, and furnaces were often banked to curtail production, although the reserve stock was only 500,000 to 1,000,000 tons. Since that time, events have shown that if the reserve stock had been 37,000,000 tons, and the furnaces had continued to produce 9,000,000 tons per annum, it would by this time all have gone into consumption. Think of the absurdity of crying over-production, with but 1,000,000 tons of iron in stock, on the eve of a period of prosperity which required an additional supply of 37,000,000. Is it any wonder that the stock during the last six years has often been down to less than a day's product, and that the iron consumers suffered?

*Read at the Indianapolis convention, June, 1904, of the American Foundrymen's Association.

If the consumers of this country are in the future to be protected as to their supply of iron, they must protect themselves as is done in Scotland. They cannot expect the producers to do it for them. If the producers sell them iron deliverable six or twelve months ahead, they must either protect themselves by storing the iron or demand a contract with the strike and accident clause. No prudent furnaceman would do otherwise; and yet to continue the present custom is to insure a continuance of the known evils of the past.

A contract with the strike or accident clause is worse than no contract at all. It is a promise with an "if." When the "if" is not called up, you would do as well without the contract as with it. When the "if" is called up, you are left in a tight place, with no one under obligation to help you out. Without such a contract you would probably have bought and piled up the iron to protect yourself. Of all the delusions and snares which attend the business systems of this country, I know of none in appearance so harmless, and yet so blighting in effect.

What the foundryman in the United States most needs is a system whereby he can purchase his iron at a fixed price, and far in advance, with the certainty of obtaining it when needed without tying up his working capital; and without piling up a surplus quantity of iron in his own yard. The Scotch warrant system has satisfied this same need in a perfect manner for 50 years, and it is for this reason that it has become the established system of that country.

In Scotland, when a foundryman takes a contract for a large amount of work, deliverable over a long term, he goes directly to a warrant dealer and makes a contract for warrants for a corresponding amount and time of delivery; these contracts have no strike or accident clause; they are positive and must be kept, or the seller must suffer the loss entailed. A warrant dealer in Scotland will sell protection to a consumer for five years ahead just as readily as he will for six months or a year. The charge he makes for such protection is based on what it will cost him to buy iron by warrant the day he makes the contract, and carry same to the dates of deliveries called for by the contract. When the warrant dealer enters into a contract to protect a consumer in this manner, he must necessarily buy warrants to protect himself, and as long as the contract of protection runs, he must own and carry warrants to protect himself. By this system the capital and space necessary for perfect protection to the consumer is provided at a reasonable cost and without his depriving his business of either capital or yard space required. The establishment of the warrant system was as great a relief to the iron producers and consumers of Great Britain as was the establishment of the national banking system to the financial exigencies of the United States. One created a demand for bonds which had never before existed, the other created a demand for iron which had never before existed; one necessitated the carriage of bonds by every national bank, the other necessitated the carriage of iron by every warrant dealer. It is through this necessity for carrying a reserve stock that Scotland accumulates six to twelve months' supply of iron, while the United States accumulates but three to six weeks' supply.

How are the American foundrymen to bring about in this country the conditions existing in Scotland? I presume Americans will have to bring it about substantially just as the Scotchmen did; that is, they will, in the beginning, have to buy and carry warrants as a reserve stock, until the business of selling protective contracts becomes an established business among iron dealers. To begin with, we have already in existence the American warrant. This warrant is simply a negotiable warehouse receipt for pig iron, which describes the brand and quality of the iron, as well as the location of the yard in which it is stored. Warrant iron is graded either by analysis or fracture; when by analysis, it is according to the rules adopted by the American Foundrymen's Association and the American Society for Testing Materials. Each warrant is for 100 tons of 2,240 pounds, and the warrant company is responsible for the brand, grade and weight described on its face. Every warrant is registered by a trust company of high standing, and no iron can be delivered from warrant yards without the signature of the trust company, and the president and secretary of the warrant company. Money can be borrowed upon them in every large city in the United States, Canada and Great Britain.

In Scotland, at the start, foundrymen who made large contracts for work, bought and carried warrants to protect themselves. By this means they held a reserve supply which was always available in an emergency. Firms of large responsibility found it easy to carry these warrants in bank, but it was not so easy for the small and less responsible ones who needed the protection just as much as the large ones. Through this condition iron dealers commenced to make future delivery contracts for warrants with the consumers. When the dealers entered into these contracts to protect the consumer they fought iron warrants to protect themselves. This business proved so acceptable to all parties that it grew rapidly and soon resulted in large carriage of warrants. Thus the system came into existence in Scotland in a natural way.

If the foundrymen of this country would introduce the Scotch system and thus obtain certainty instead of uncertainty in their iron supply, they have only to refuse to accept contracts with the strike or accident clause, and if in the beginning they cannot procure binding contracts, then buy and carry warrants themselves as a reserve. Just as soon as the sellers realize that the consumers will buy only by positive contracts, they will be ready to sell them in that way. When this is done, however, the consumers must recognize the fact that whosoever sells the positive contracts takes a risk, and is giving the consumers a protection which is of value, and for which they must be willing to pay a reasonable amount, just as they do for marine or fire insurance. The little they pay for it will be returned ten-fold in time.

There is an impression among many that in Great Britain consumers purchase the iron they consume by warrant. This is a mistake. Consumers there buy nearly all the iron they use from the makers or their agents, precisely as they do in this country. The warrants which the consumers contract for as protection are to them nothing more than protection. As the months roll by, they purchase the iron or steel they wish for their work of the brand, quality and shape they require, from whosoever will make the most satisfactory terms, and simultaneously sell on exchange an equal quantity of warrants. If iron has gone up, say, 20 shillings, they pay that much more for their material, and get about that much more for their warrants. If iron has gone down, say, 20 shillings, they buy their material for that much less, and get about that much less for their warrants. In this manner they eliminate every speculative element from their business and thus insure their legitimate business profits.

Statistics show that the population of this country not only increases enormously, but the consumption of iron per capita increases at a cumulative rate. We consumed about 100 pounds per capita in 1855; 300 pounds per capita in 1890, and 500 pounds per capita in 1902. It further appears that this two-fold increase doubles the country's consumption about every ten years, but the yearly increase is not proportionate. For seven or eight years consumption remains practically on an even plane; then it receives an impetus which causes it to be doubled within two or three years, during part of which time we experience what has been designated as a pig iron famine. After such periods of famine, the succeeding seven or eight years of dullness and plenty has heretofore lulled us into a delusive feeling of security.

For forty years the late Hon. Abram S. Hewitt predicted these enormous increases, and they have always been verified. Recently the Hon. Edward Atkinson has predicted that the consumption of iron in the United States will reach 40,000,000 tons per annum between 1910 and 1913. This prediction, like those of Mr. Hewitt, is not a fanciful outbrust of imagination; it is simply the result of a mathematical calculation based upon the exact growth of the past, and its fulfilment is as assured as is the future growth and expansion of the country. The law of supply and demand is inexorable. The supply of iron for any given period is the stock on hand at the commencement of that period added to the current production during the period. If in 1910 the stock on hand is one million tons, the production eighteen millions, and the demand forty millions, then the supply will be twenty-one million short of the demand the first year of the boom, and no human power can prevent another iron famine.

The past we cannot revoke, but we may profit by its lessons. If we permit the same conditions which have existed for the last eighty years to continue, we will experience the same results. The year 1897 seems a very little while ago; to 1910 will be a still shorter period—hardly time to prepare. If we are to be ready for the next boom, we cannot commence too soon or work too fast. Those who are the first to adopt the Scotch method will get the greatest benefit from it, and when the next period of scarcity and high prices comes, if there are any who have not adopted that system, they will be handicapped, for what iron there is on hand, and what is produced, will naturally go to the consumers who hold binding contracts, in preference to those who hold contracts with the "strike and accident" clause. If, on the other hand, all consumers should from this time on decline to make other than positive contracts, and when the next season of prosperity comes we will be equipped with an ample stock of iron. The famine in supply, arbitrary labor strikes, and advances in prices will be prevented, and thereby insure your ability to supply the demand of the country with promptness, with comfort and with profit. The extra demand created in gathering the reserve supply will be a benefit to producers while it is being accumulated, and to consumers while it is being used.

This question is not only one of great importance to the consumers of this country, but it is one that vitally affects our foreign trade. As long as this country fails to carry a large stock of pig iron, her foreign trade in iron and steel will be subject to interruptions. In 1895 the United States commenced to export pig iron, and inside of three years this business grew so rapidly that she was exporting iron to all the manufacturing countries of Europe. When prosperity returned in 1899, the relation of supply and demand in the two countries resulted in an advance of 300 percent in the price of pig iron in Alabama against 65 percent in Glasgow. The result was that the export business which we had built up in pig iron was wrested from us completely by Germany and Great Britain.

For fifteen years the average stock of iron carried in the United States has been less than three weeks' product. During this same period Scotland has carried more than six months' product. Think of the United States attempting to control the iron trade of the world with a stock equal to less than twenty-one days' production!

John Fox & Co. were the lowest bidders for the cast iron water pipe required by the water department of the city of New York. Bids were opened last week and indicate more competition and lower prices than have been experienced for many weeks. One contract, which is to be delivered within 100 days, consists of 620 tons of 6 to 36-inch pipe and 490 tons of specials; the lowest price was $23.45 for pipe and $54 for specials. The second contract is for 1,120 tons of 4 to 24-inch pipe and 420 tons of specials; the lowest bid was $22.75 for pipe and $47 for specials. The second contract is to be delivered within 200 days.

Trustee in Bankruptcy Aldrich of the New York Car Wheel Works, Buffalo, has been given until July 1st by the referee in bankruptcy to produce depositions in support of his petition that the claim of the North American Trust Co. of Philadelphia, for $96,000 against the Car Wheel Works be disallowed on the ground that there was no consideration given for the notes on which the claim is based, as mentioned in our issue of last week.

The Mexican Car & Foundry Co., capitalized for $1,000,000, with an authorized bond issue of $500,000, has begun operations at its plant near the City of Mexico. The plant will have a capacity of five freight cars daily to begin with, but it is expected that it will soon be turning out electric cars.

Only four of the 12 open-hearth furnaces of the Carnegie Steel Co., South Sharon, Pa., are in operation. It is reported that furnace No. 1 will be blown out and new stack No. 2 will be blown in shortly. Furnace No. 1 has been operating steadily for nearly two years and is to go out for repairs.

JOHN A. TOPPING SUCCEEDS PRESIDENT GRAHAM.

John A. Topping, who was elected president of the LaBelle Iron Works, at Steubenville, O., in October, 1903, has tendered his resignation, effective Aug. 1, to accept the presidency of the American Sheet & Tin Plate Co., as successor to William T. Graham. About a year ago Mr. Topping resigned the position of vice president and general manager of sales of the American Sheet Steel Co., which position he had held since its organization, and shortly thereafter was elected head of the LaBelle Iron Works. He is well qualified to fill the position to which he has been chosen, having had a wide experience in both the manufacture of sheets and tin plate as well as in the production of iron and steel. For years he was intimately associated with Mr. Graham in the development of the iron and steel industry in the Wheeling district, and has succeeded the latter in important positions from which he has been advanced to greater responsibilities. The two became associated at the old Aetna Works at Bridgeport, O., in an official capacity, the plant later having been consolidated with the Standard Iron Works under the name of the Aetna-Standard Iron & Steel Co., of which Mr. Graham was president and Mr. Topping secretary. The consolidation of this plant with the Junction Iron & Steel Co. made the Aetna-Standard company one of the strongest in the Wheeling district. When Mr. Graham was elected an officer of the American Tin Plate Co., Mr. Topping succeeded him as president of the Aetna-Standard Iron & Steel Co., which position he held until the formation of the American Sheet Steel Co., and the absorption of the Aetna-Standard sheet mills by that company. Mr. Topping became vice president of this company, and was in charge of sales. I. M. Scott, who resigned his position with the American Sheet Steel Co. when Mr. Topping resigned and who was chosen first vice president of the LaBelle Iron Works, will undoubtedly succeed to the presidency.

The Canadian Rand Drill Co., Sherbrooke, Que., has just closed with the Canadian Westinghouse Co., of Hamilton, Ont., for the installation of a Rand Corliss compound, power-driven, air compressor, to be installed in the latter company's new plant. This machine is designed to furnish air for the various pneumatic appliances throughout the works and is to be driven by a Westinghouse motor, through a Morse chain drive. The International Coal & Coke Co., Coleman, Alberta, has just placed an order with the Canadian Rand Drill Co. for a 300-h. p., steam driven, Rand duplex compressor of the latest type.

The pattern and model shop of John H. Hall & Co., of Minneapolis, Minn., is one of the noteworthy jobbing pattern shops in the Northwest. The senior member of the firm has been engaged in pattern making at Minneapolis for 15 years, and has specialized in patterns and models in a way that has given him a unique reputation in these lines. In spite of the generally reported slackening in orders, the business of this company holds up well.

Stockholders of the South Atlantic Car & Mfg. Co., Waycross, Ga., held a meeting last week and declared a second dividend of 4 percent for the fiscal year ending April 1. They also declared a stock dividend of 25 percent, increasing the capital stock of the company from $100,000 to $125,000. The company has been in operation about ten months and its profits within that time have been $69,591.47. A 4 percent dividend was declared after the first three months. The company is not now running in full force on account of a lack of orders.

The property of the Morse Iron Works & Dry Dock Co. at the foot of Fifty-fifth street, Brooklyn, has been sold to John F. Cadigan for $50,000 over mortgages aggregating $510,000. The purchaser bought the property, including all machinery and effects upon the premises, on behalf of the mortgagee and the plant will now be opened again. It is the intention of creditors to reorganize the company and continue the business under a new name.

PATTERNMAKING IN RELATION TO FOUNDRY COSTS.*

BY W. H. PARRY, BROOKLYN, N. Y.

That diverse opinions on the art of molding are sometimes held by patternmakers and molders cannot be denied, and, if by the reading of papers and discussions on subjects of interest to these brother craftsmen, a better understanding will be brought about as to the needs of the foundryman in his endeavor to produce casting at the least possible cost, an immense amount of good will have been achieved at the very outset.

When we consider that a molder is compelled to make castings with practically no means to a successful end than a box or two plus a pile of sand, it is wonderful indeed in these days of keen competition that castings can be made commercially profitable.

In addition to being handicapped by the appliances at hand, the molder has very often to contend with patterns most fearfully and wonderfully constructed in that they cannot be molded in a practicable manner, and, on the other hand, patterns also, most beautifully made but "unmoldable" just the same.

The all too common practice of sending an order for hundreds of castings from one small pattern to be delivered in a day or two, is still with us, and nothing increases foundry costs more than this, except perhaps the good Samaritan who sends to the jobbing foundry a dozen or so metal patterns—minus a match board—so gated that all the dirty metal will enter the mold, thus assuring a high percentage of lost castings.

The loam molder who is fortunate enough to be provided with all the loose pieces necessary to complete his mold, is in luck, and how often does it occur that when the loose pieces are furnished, they do not come within a reasonable distance from his sweeps, or project inward or outward enough to necessitate amputation.

Another fruitful method of increasing foundry costs in connection with loam work is the growing disinclination to make the necessary core boxes, so shaped as to perfectly match the main loam core. The excuse is advanced that there are chippers employed in the foundry for this work. This procedure is the rankest kind of heresy and not fair to the foundryman or the molder who is making his best efforts to cheapen the cost of castings.

The making of patterns without fillets and marking the corners with dotted lines so that the molder is compelled to cut them, cannot be excused upon the ground that there is but one casting wanted, as wood or leather fillets can be bought and applied cheaper than the cost of the molder's time in slicking the round corner.

Unvarnished patterns with glue joints improperly made, or with daubs and beads of glue sticking out, especially in corners where the lift is greatest, does not aid the molder at all. It is moreover worthy of any pattern shop foreman's attention to see that patterns do not reach the foundry in this condition.

The use of cheap varnish is to be deprecated for all patterns, the more so on the larger ones that are apt to be left in the sand over night. It entails extra work on the molder in mending the mold, due to the glue oozing through the fresh varnish. In fact, it is not at all uncommon for the pattern to shed a fair proportion of its varnish coat in the mold itself, when exposed to the "touching" effects of moistened sand at night. Hence it would appear to be true economy to use none but the best varnish on wood patterns of all kinds.

The making large patterns in sections so that each part can be drawn from the sand independent of its neighbor, is very often a great help to the sand artist, and if it is possible to do away with deep cope lifts through the medium of suspended cores in the cope, so much the better for the foundry and pattern shop, in many instances.

Again, large or small patterns that are slapped together any old way by men who know better than to expect a pattern to be drawn from the sand without any draft, is very bad practice. It has been my "privilege" many a time to have witnessed good molders attempting to make presentable castings from such patterns, only to have them returned as not being "true to pattern." One case in particular may be mentioned. A cement mill hopper frame some thirteen feet in length, by a width and depth of some six feet or so, was constructed with so little regard to the molder's feelings, that casting after casting was lost, until through the insistent demand of the foundry boss, a few inexpensive core boxes were made, which allowed the piece to be cast successfully and with less trouble and expense.

The placing of fillets on core-prints, where they join the pattern, to avoid a "crush" is good practice, and should be universally adopted, at least where cores of great bulk rest thereon. While it increases the chipper's work it decreases the chance for lost castings.

On complicated core work time and castings can be saved by having the set of cores made strongly wired without any attention being paid to venting them, and sent to the pattern shop, or any other suitable place, to be assembled on core jigs of wood. Any error can thus be detected and core boxes or core prints corrected while the concrete evidence of errors is present. When the object of these trial sets is explained to the foundryman, he will always be willing to provide them, as it lets him out of a lot of trouble.

To the list of shortcomings incident to the making of patterns could be added many more. The object sought in pointing out these little sins of omission and commission is, that while we have been guilty of these things in the past, there is no reason why they should be continued in the future, if the rising generation of patternmakers is to be taught that cheap work in the pattern shop does not necessarily produce castings as cheaply as they ought to be made in the foundry.

*Read at the Indianapolis meeting of the American Foundrymen's Association, June, 1904.

The Charles G. Smith Co., Park building, Pittsburg, has issued a handsomely illustrated "Album of Machine Tool Illustrations," 6 x 9 inches and containing 127 pages. Descriptions and specifications have been omitted, inasmuch as they soon become obsolete owing to changes in details which are not apparent in the illustrations. The lines of tools this concern handles direct are fully illustrated and are as follows: Becker-Brainard Milling Machine Co., milling machines, gear cutting machines, profilers, planer type milling machines and universal cutters and tool grinders; Bullard Machine Tool Co., boring and turning mills, rapid production lathes and turret machines; P. Blaisdell & Co., engine lathes and drill presses; Whitcomb Mfg. Co., planers; Mueller Machine Tool Co., radial drills, center grinders; the Bath Grinder Co., universal grinders; the Safety Emery Wheel Co., grinding machines and emery wheels; Meadville Vise Co., cylinder boring and facing machines; Samuel Tretheway, steam hammers; Lucas Machine Tool Co., power forcing presses; Eastern Machinery Co., Frisbie friction clutches, and the Standard Engineering Co.'s bolt threader and pipe threading and cutting machine.

The Fannie furnace of the Cherry Valley Iron Co., West Middlesex, Pa., was blown in on Wednesday, and the Leetonia, O., stack of that company was blown out. The Fannie furnace has been entirely rebuilt during the past six months and enlarged. At Leetonia an entirely new stack will be built, the new stack to be 18 x 80 and will have an output of 350 tons daily. An automatic skip hoist is also to be erected, and when these improvements are completed this will be one of the most modern merchant stacks in the Valleys. In the past two years extensive improvements have been made at this plant and with the erection of the new stack it can be said that an entirely new plant has replaced the old one. In addition 60 coke ovens are to be added at this plant, making a total of 210, the output of which will be sufficient to furnish this furnace with its coke supply.

Judge Kohlsaat, of the United States District Court in Chicago, has appointed the Equitable Trust Co. receiver in bankruptcy of the Emlyn Iron Works, which has a rolling mill at East Chicago. The action followed the filing of a petition by the Chicago National Bank alleging insolvency. It is stated that the liabilities of the company are $150,000 and the assets $100,000. The plant has been in operation since the first of the year.

ATLANTIC CITY MEETING OF THE AMERICAN SOCIETY FOR TESTING MATERIALS.

(Continued from Page 51.)

invested in steel cars that are slowly being eaten away by rust which cannot be prevented.

The discussion was opened by Dr. A. H. Sabin who spoke as follows: In the committee report presented, each member made his own report owing to the difficulty of having all the members agree on the various points. All agreed that impermeability to moisture was one of the conditions to be satisfied by a protective coating, and they also agreed that no one coating has this quality to perfection. Varnishes are less porous than other films, but even they must have successive coatings. I have heard of the impermeability of Portland cement and the attempts that are being made to put it on iron, not bending it, but so many difficulties have to be overcome that up to the present these efforts have not met with success, although those experimenting with it have hopes. The railroads are satisfied if paint on an ordinary bridge lasts three years and is still in good condition, but the paint men can show bridges in good condition for ten years, where the paint has been applied properly. The proper application of paint is one of the most important points to be considered in connection with this subject. The paint men say that the metal should be thoroughly cleaned before the paint is applied, but consumers do not agree to this, as the scale can only be taken off by pickling or by sand blast and both are expensive, and impracticable in many instances. If either of these cleaning methods is pursued the paint must be applied very quickly, as iron that has been subjected to the sand blast in a moist atmosphere will change color in two or three hours. The purple scale on iron, which does not permit of easy removal, has been found to be an excellent protection to the iron and is a good surface to paint on. In applying paint to bridges and other structures little saving is effected by spraying, owing to the loss in paint and it will be found that the brushing of paint by hand will average up just as cheap and will probably give a better surface. Paint should be applied with a stiff brush, well rubbed in to get rid of the air film, some railroads employing gangs of painters who make a specialty of painting the different properties, and excellent results have been achieved. The percentage of dryer in paint should not be too large. It should not dry in less than twelve hours and another coat should not be applied in less than a week. The thinness of the paint film I consider its great weakness, as three or four coats will only give a film 3 or 4 one-thousandths of an inch in thickness. I consider it a mistake to paint low bridges where the smoke from the engines passing underneath will have the sand blast effect, the coating should be another substance that will not be attacked in this way.

Dr. Dudley—I agree with a great deal that Mr. Sabin has said, and I will furthermore state that the proper application of paint to the thousands of steel cars that the Pennsylvania Railroad Co. has had built since 1900 has caused a great deal of friction. We found that the paints were not applied in the condition that the paint manufacturers furnished them, as tests of the paint that was being used showed that it was not the same article that was furnished by the paint manufacturer. I do not agree with Mr. Sabin on the time required in drying the paint—keeping a steel car out of service for a week or two to permit the paint to dry. It would earn enough in that time to pay for several paintings. Rapidity of drying, however, is not a concomitant of good paint. What causes steel to rust is the great question, and if we can keep the moisture away from the steel it will not corrode. How can we exclude the moisture? is the great question.

Dr. Dudley then related experiments that were made to test the impermeability of paints. Dextrine mixed with water was applied to glass and the moisture evaporated. Successive coats of paints were then applied to the dried dextrine, and when dry the glass was immersed in water. Thus far no paints have been found that did not admit the moisture, as was shown by the dissolving of the dextrine in every case. He stated that he believes that in applying the paint air bubbles were created and that through these small bubbles, the moisture worked down to the dextrine. In the same way, it is the speaker's theory, the moisture works through the coating of paint to the iron or steel and causes corrosion. In talking with practical painters, Dr. Dudley learned that they hope to cover these bubbles by successive coats, the succeeding films of paint covering the previous bubbles and the additional bubbles not occurring in the same place. He did not believe that the cleaning of the surface by sand blast before painting gave any better protection, his idea of cleaning being simply to remove the loose particles on the surface. The Jersey City train shed of the Pennsylvania Railroad Co. a little less than two years ago had a novel coating applied which thus far has proved impermeable to moisture. Before the first coat of paint was dry a layer of paraffine paper was applied, care being exercised to have it lap well at the edges. On top of the paper the coat of color was applied, the paper absolutely protecting against moisture. This method is only applicable in stationary structures, and could not be applied to movable ones such as steel cars, etc.

Others were of the opinion that no coating can be devised that will answer all purposes, and for that reason suggested that engineers and architects know all about the paints they want to use, and the work they want it for, and can secure better results than at present, as the number of excellent paints on the market for various purposes was stated to be large. To secure the rapid drying of the first coating on steel cars Dr. Sabin suggested a drying oven, to have a temperature of 200 to 250 degrees F., which would bring about the drying of the first coat in 7 or 8 hours. Dr. Dudley replied that the matter of erecting such ovens was being discussed by the Pennsylvania railroad, and it is possible that this will be given a trial. In answer to a question as to what coating is put on steel before imbedding it in concrete it was stated that no coating whatever was applied.

The canvass of ballots in the annual election of officers showed the choice of the following: Charles B. Dudley, president; R. W. Lesley, vice president; Edgar Marburg, secretary and treasurer; James Christie, member of the executive committee.

SECOND SESSION.

President Dudley's Address.

At the Thursday evening session Dr. Chas. B. Dudley made the annual address, taking for his subject "The Influence of Specifications on Commercial Products." Referring to his resume last year, the president said that two parties are involved in a specification, the producer and the consumer; that both had a right to a voice in the formation of the specification, and that a carefully balanced specification, was a protection to both. In the paper of this year he considered a little more closely the side of the consumer, inasmuch as the influence of the latter on commercial products in far greater than in commonly supposed. Continuing he said:

"Take for an illustration the new high speed tool steel. The manufacturer seemingly decides everything in regard to this new product independent of the consumer. He first learns how to make the steel, decides what its composition should be, learns how to treat it, practically changes all our ideas as to what heat will do to a piece of steel, and develops a new art of hardening and tempering. After his studies are finished he comes forth with his creation and teaches the consumer how to use it. Surely it may be urged, in such a case as this, the influence of the consumer on the product is not apparent. But those who so argue, we fear, can have had very little experience at the birth and death of new things, many of them good—new things which might have had perchance a long life of usefulness, if their sponsors had not attempted to ignore the legitimate influence which the consumer has on even new commercial products, the fruit apparently of the brain energy of the producer alone.

"The influence of the consumer on a new commercial product is usually made manifest in the price he is willing to pay for it. If the new product is higher in price in proportion to results contained than that which he is at present using, or if, even though economies are shown, he conceives the price is unreasonable, he will usually go on as he has been doing in the past, with the result that the new product fails to be successful. Makers of new things far too often make one or both of two serious mistakes. They either fail to study sufficiently the present condition of the field which their new

product proposes to occupy, and, as a consequence, make the product cost so much to manufacture that it cannot successfully compete with what is already in the field; or, having studied the field carefully and thoroughly, and having developed a new product, they place a price on their product, such that the ultimate economy to the consumer is so small that there is no real reason why he should change.

"The point which we are trying to make is that always and everywhere in every successful commercial product both the producer and the consumer each have a legitimate sphere, and that any attempt on the part of either to ignore the other will result in disappointment and failure. As we have tried to urge on other occasions, it is only by working together, by each respecting and honoring the rights and privileges of the other, that successful results can be obtained.

"There is another view of this case which will perhaps bear a few moments' consideration. A sound commercial transaction is one from which both sides secure advantage. A producer has something to sell, from which he hopes to reap the reward of the successful business man. How shall he best accomplish this? Surely not as is too often the case, by trying to give the buyer or consumer that which he may happen to have in stock, whether it is fit or not, and trying to persuade him that it will be found all right; but on the other hand by trying to understand what the consumer really needs and devoting his energies to furnishing that thing, and nothing else. Or, again, a consumer has a want and goes to a producer for something to meet that want. Shall the producer for the sake of the immediate transaction supply that which he knows will not give ultimate satisfaction? The temptation is certainly great, and the loopholes and possible explanations of failure are so many, that it is to be feared in too many cases the transaction is accomplished without due regard to its effect on subsequent business. But I stoutly maintain that such procedure is shortsighted business policy, and that far too soon, those who habitually do not give satisfaction, will find their customers slipping away from them. In business parlance, they 'cannot hold their trade.'"

Examples in Steel.

Continuing, the speaker cited examples of the adoption of forty or more specifications at Altoona during the past 25 years, showing the influence of the consumer in these instances on the producers. From the field of steel metallurgy he considered a group of specifications and continued as follows:

"For our purpose it will be sufficient to choose out from the innumerable uses of steel, three grades—soft, medium and hard. Let the boiler and fire box steel specifications represent the first, the axle and crank pin specifications represent the second, and spring steel specifications the third. Now it is well known that the grades of steel defined by these specifications differ from each other principally in the amount of carbon which they contain. The limiting amounts of the other constituents are of course not all alike, but the principal differences, making the various steels applicable to their designed use, is in the carbon, approximately .18 of 1 percent for boiler and fire box steel, .45 of 1 percent for axles and crank pins, and 1 percent for spring steel. When these specifications were first drawn, some of them provided only for physical tests, some for chemical tests only, and some for both. Whatever the method of testing the shipments, however, when the specifications were first made, they provided only lower limits; that is to say, in fire box steel, a minimum tensile strength and a minimum elongation were specified. The manufacturers might furnish a product as much above these minimum limits as he chose. Exactly the same restrictions applied to the axle and crank pin steel. In spring steel a minimum content of carbon was given with no upper limit. Two or three reasons led to this procedure. First, there was the desire to leave the maker the widest possible freedom, in the manufacture of the material; second, there was at that time no known reason why there should be any upper limit; and third, it was actually thought that a minimum limit in strength and elongation being secured, or a minimum amount of carbon, the product would really be better the more these minimum limits were exceeded.

"But as time progressed, and especially as the study of parts that had actually failed in service—that never ending source of valuable information—became wider and wider, it began to appear that an upper limit likewise was a desideratum in specifications. The boiler plate sent when there was no upper limit, occasionally gave difficulty in the shops in flanging, cracking at the bends, and an analysis and physical test of such plates, demonstrated beyond question that the carbon and the tensile strength were too high for successful hand flanging at such temperatures as are usually employed in this operation. Axles and crank pins, which under the slow moving strain of a tensile test, or under the drop test as then carried out would quite fill the requirements, would not infrequently fail in service, either by breaking in detail, or as the analysis would frequently show, due to an improper proportioning of the chemical constituents. Spring steel with a lower limit of carbon only would occasionally fail in service, owing to apparently over hardening with the very high carbons, or would give difficulty in the shops when working it, owing to the wide range of carbon in a shipment. Moreover, as the knowledge of the influence of carbon, and especially of manganese and silicon on the physical properties of steel increased, and especially once again as the analysis of parts that had either broken or failed in some other way in service, or had given difficulty in the shops, began to increase and become an element in the making of specifications, it became evident that the chemistry of steel was destined to play a continually more and more important part in obtaining a metal that would give best results. Accordingly it was decided to revive existing specifications, and introduce both an upper limit in tensile strength, and also as much chemistry, with both lower and upper limits, especially in the carbon, as the information at hand seemed to indicate was necessary to secure the proper material. But upper and lower limits of carbon involve the idea of a range. How much shall the upper limit be above the lower limit? Obviously if the range was too narrow the steel maker would find it difficult, if not impossible, to make the metal. On the other hand, if the range was too wide it would go far toward defeating the end to be accomplished by the introduction of upper and lower limits. In view of this dilemma, it was with some misgivings that specifications embodying these features were prepared and issued. The limits finally decided on were from 0.15 to 0.25 percent of carbon, or a range of ten points for soft steels such as fire box, from 0.35 percent to 0.50 percent, or a range of 15 points, for medium steels, such as are used in axles and crank pins, and from 0.90 percent to 1.10 percent or a range of 20 points for hard steels such as are employed in making springs.

"It is gratifying to be able to state that the limits have not proved too narrow. With very few exceptions the steel makers have cheerfully and successfully worked within these limits. Is it too much to say that 20 years ago this would have been thought impossible? How many steel makers 20 or 25 years ago felt sure enough of their furnaces and their methods so that they would be willing to take orders and guarantee successful outputs on such limits as these? It of course is not claimed or even thought that this decided step forward in steel metallurgy is wholly due to specification, but is it too much to claim that the results now possible are in part at least due to the stimulus put upon the producer by the demands or desires of the consumer as embodied in specifications.

Fire Box and Axle Steel.

"The mass of the first steel used in fire boxes contained from 0.10 percent to 0.13 percent of carbon. But a few years of service developed the fact that such soft lead like steel was badly abraded by the coal, and failed to satisfactorily hold the thread on the stay bolts. Hence in the specification at present in force, a harder metal whose carbon has already been given, was asked for. This change introduced no serious difficulties in manufacture, and very large quantities of the harder product have been furnished, and more successfully used, for some years now.

"The first steel passenger car axles contained from 0.22 percent to 0.26 percent of carbon. But in the course of a year or two, a number of these soft axles broke in detail, and a study of the case led to a demand for a stiffer steel for this purpose. Accordingly when the present chemical specification for axles was prepared, the limits of the car-

bon were placed at from 0.35 percent to 0.50 percent as has already been stated. These proposed limits led to no small amount of discussion. At that time few if any axles had ever been made containing over 0.30 percent of carbon. It was feared that even though the proposed metal might be successfully made in the furnace, it could not be successfully forged. One steel maker told us in plain language we were making a most serious mistake, and that we would rue it. Another opposed the proposed specifications in every reasonable way possible, and only took an order under it with the utmost misgiving. So great was the uncertainty and doubt about the ability to successfully make axles in accordance with this specification that the first deliveries were actually billed at 3½ cents a pound. Within four months the price dropped to 1½ cents. Furthermore a couple of years ago indications began to manifest themselves that even the present axle specification required modification in such a way as to require a stiffer metal still. Accordingly a number of the steel works were visited and the matter talked over with the experts, as to whether they would be willing to try to make axles with from 0.50 percent to 0.65 percent of carbon. No one was found willing, but within six months word was sent by one of the works, that they would gladly try it. Under the stimulus of the request, experiments had been made which promised a successful outcome, and although the question of stiffening the present axle has not yet been decided, there seems no good reason to fear, that if higher carbon is decided on as the best solution of the problem, there will be any difficulty in obtaining it. Ten years ago we would have hardly dared to hope for it.

Spring Steel.

"It was for a long time customary to use only crucible steel in making springs, either helical, elliptic or semi-elliptic, and in these springs the carbon employed was usually from 0.65 percent to 0.75 percent. The service of these springs was very unsatisfactory. The breakage was something appalling, such that at some of the important repair shops, a car load of broken helical springs, would accumulate in a few months. At that time the spring makers decided on both the kind of steel to use and the design. They were given the space that could be allowed for the spring, and the load it must carry, and they did the rest. In fairness it should be stated that the conditions were severe, and that apparently neither producer nor consumer, understood the situation. Very few tests had ever been made, and apparently the strains in the metal had never been calculated. The matter was taken up with some vigor by the consumer's experts and an attempt made to get an understanding of the situation. It developed that when some of the helical springs then in use were brought down solid, the strain in the outside row of fibres was over 110,000 pounds per square inch. What wonder that the springs broke. As a result of the study of the matter, a specification was prepared covering both the design and the quality of steel to be used. In view of the small space available, and with the tendency toward increasing loads already mentioned, it was felt that every advantage must be taken, and accordingly a round bar was decided on as being best able to resist the strains, instead of the flat or oval, which had previously been used, the maximum fibre stress was placed at 80,000 pounds per square inch, instead of the indefinite 110,000 pounds or more which had been characteristic of previous practice, and also a one percent carbon steel was specified instead of 0.70 percent as had previously been used. Still further no mention was made of the process by which the steel should be made.

"This proposed specification likewise met with some antagonism. It was urged, not without a good deal of show of reason, that crucible steel was the only fit material to use in making springs, and that so hard a steel as is given by one percent of carbon would be unreliable and probably cause more difficulty than had heretofore been experienced. It should perhaps be added for information that at this time the possibility of making a high carbon steel in the open-hearth furnace, had not been fully demonstrated, and that this proposed spring specification, leaving out the process by which the steel should be made, was a direct stimulus in the development of this method. The crucible steel people were therefore naturally a little anxious. It is undoubtedly well known that at the present time by far the largest portion of the steel used in springs, is made in the open-hearth furnace. Notwithstanding the antagonism, the specification as drawn was sent out, and although there were some difficulties at the start, and one spring maker, at least, refused to fill orders, it soon became evident that the specification was going to survive. The results in service were most gratifying. When 30,000 helical springs according to specifications had been put in service, a count was made of those which had broken, and only two were found. After three or four years, when there were perhaps two or three hundred thousand of these springs in service, a request was sent to one of the principal repair shops, to send twenty broken springs to the laboratory, in order that the relation between phosphorus and broken springs, might be studied. At the end of three months, only twelve had been secured, and these were used as the basis of the investigation. The effect of the specification on the producer was equally satisfactory. Special and patented forms of bars absolutely disappeared, the open-hearth steel makers soon learned to make with perfect success a high carbon steel, and from being antagonistic, the spring makers soon changed to the warmest friends of the specification, and recommended it everywhere to other railroads.

"The influence and voice of the consumer in the manufacture of commercial products have come to stay, and it is simply the part of wisdom for all concerned to recognize the situation. Also since both the producer and consumer have each a direct interest in the product or thing made, the one in its production and sale, and the other in its use, there is no real reason why each should not study the product in most minute detail."

Alloy Steels.

William Metcalf, the pioneer steel manufacturer of Pittsburg, read an able paper entitled "Alloy Steels: Self Hardening and High Speed" (printed in full elsewhere), in which he discussed the manufacture and the records of high speed steel at some length.

Growth of the Cement Industry.

R. W. Lesley presented statistics of the cement industry in America, graphically showing by drawings and stereopticon views, the tremendous growth of this industry until today it is abreast of that of Germany, which has been the leading cement producing nation. A few of the figures showing the growth of the Portland cement industry in this country and the falling off in the imports are given below:

Year.	Domestic Prod., Bbls.	Imports, Bbls.
1890	335,000	1,940,186
1895	990,324	2,997,395
1896	1,543,023	2,989,597
1897	2,677,775	2,090,924
1898	3,692,284	2,013,818
1899	5,652,266	2,108,388
1900	8,482,020	2,386,683
1901	12,711,225	939,330
1902	17,230,644	1,961,413
1903	19,000,000 estimated.	

The total production of both Portland and natural cement has grown from a production of 509,110 barrels in 1850 with a per capita production of 6.5 pounds to 25,274,949 in 1902, when the per capita production showed the enormous increase to 123.7 pounds. In 1880 the number of establishments manufacturing cement in this country numbered 28, and in 1890 there were 79 establishments, of which 16 were engaged in the production of Portland and 13 natural. The tremendous growth of the Portland cement industry is shown by the figures of 1902 when there were 127 establishments in this country, of which 65 were producing Portland and 62 natural. The output per mill from the Portland cement establishments has grown from 20,970 in 1890 to 265,000 in 1902, while the natural mills only show an increase from 118,113 barrels in 1890 to 129,750 in 1902.

THIRD SESSION.

Cast Iron.

Separate sessions were held on Friday morning by the sections on cast iron and cement, these sessions as well as that on Saturday morning were held on the steel pier. The report of Committee B on standard specifications for cast iron and finished castings was presented by the chairman, Walter Wood. The standard specifications proposed and reported on by the committee included those for Foundry Iron, Pipe and Special

Castings, Locomotive Cylinders, Car Wheels, Malleable Castings and Gray Iron Castings. In submitting his report, the chairman said:

"In laying before the meeting the results of the work of the sub-committees in the form of the proposed standard specifications for cast iron and finished castings, there is little to add, except to call attention to the fact that care was taken in forming these sub-committees to appoint on them men prominent in each specialty covered by these specifications. Each committee in doing its work followed the same general plan, namely, to discuss among themselves, either at a personal meeting or by correspondence, the general form, details and features of the specifications. As each specification was completed the final result was referred as a whole to each member of the committee, and the result reached was as nearly unanimous as could be expected where men of strong individuality compare and adjust differences of views. It is hoped that the committees which have as yet not been able to report, namely, those on 'Influence of the Addition of Special Metals to Cast Iron,' and 'Micro-Structure of Cast Iron," will, as time goes on, be able to lay before the society interesting facts on these two important subjects, which really lie at the foundation of the intelligent study of the physics of cast iron, and this, after all, is the basis upon which practical results must rest.

"The International Association expecting to meet in St. Petersburg in August of this year, the president requested that all matters to be brought before that congress should be in his hands by Jan. 15. Copies of the specifications now before you were therefore duly forwarded to President Tetmajer. It is hoped that the postponement of the congress on account of the war will permit a full discussion of these specifications by our foreign associates, so that when the next congress meets, it will be possible to reach some definite conclusion as to international specifications.

"The drafting of standard specifications naturally brings into harmony various thoughts and suggestions, all of which are good and lead to practical results, and which probably only need to be reduced to a system for the sake of reaching the desirable end, viz.:—a uniformity of methods. In addition to this general purpose, the committees have had in mind two most important points: 1. To establish an intelligent standard for the purchase and sale of pig iron, and thus to abandon the old-fashioned way of grading the metal from its appearance. 2. To adopt a standard test-bar, and to fix the manner in which it shall be made and tested. The committee has furnished a measure to which the test-bars now in use throughout the various trades can be referred.

"If nothing further had been accomplished, the work of the committees would have been most useful. They have gone further, however, and have covered quite thoroughly the whole field of cast iron and finished castings."

Foundry Iron Specifications.

All of the proposed standard specifications have been previously published in these columns and only the discussion will be touched upon. In considering the foundry pig iron specifications it was agreed that the penalty of 1 per cent was entirely too low, and it was suggested, in accordance with the action of the American Foundrymen's Association at its recent convention in Indianapolis, that this be increased to 4 per cent, the buyer retaining the right to keep or reject the iron. In making this suggestion it was stated that without this option a small foundry desiring a certain quantity of iron of a certain grade, if it did not conform to the specifications, would be compelled to take in an iron of an entirely different quality from that desired, and for which no immediate use would probably be found. In the case of large foundries, on the other hand, this rejection clause is not so necessary, as such iron can always be used, but for the protection of the small founder this option was suggested for insertion.

The question of castings showing an increased sulphur content over that contained in the pig iron was brought up. Dr. Dudley stated that much iron is spoiled on the molding floor. Sand castings show this increase in sulphur owing to the sulphur in the coke which all practically reappears in the casting, and as the very best grades of coke contain as high as .75 per cent of sulphur the increase in the sulphur in the casting over that contained in the iron can be readily explained. Owing to the high sulphur content in coke, it was formerly and is yet to some extent the practice to use anthracite coal for fuel. Dr. Dudley was asked whether this sulphur could not be kept down by the use of an air furnace, and he explained that it could, but that the process was four or five times as costly as the cupola method of melting.

Mr. Kinkead—By the use of manganese the sulphur in the iron can be greatly reduced, the manganese being used in the pulverized form and put into the ladle, or a manganese iron could be used. Furthermore, by melting iron fast and not permitting it to be in contact with the coke too long the sulphur can also be kept down.

Dr. Moldenke said that in some European foundries an oxide of manganese is used for this purpose with a basic flux, and as a result the sulphur is greatly reduced. Dr. Dudley stated that the sulphur limits for foundry iron specifications are without a doubt difficult to limit, owing to the fact that many excellent castings contain high percentages of sulphur. However, he added that these specifications were just something to begin on and that they can be changed from time to time. The specifications, together with the suggestions, were referred back to the committee for modification, after which they are to be referred to the executive committee.

The specifications for cast iron pipe and special castings were adopted, while the proposed specifications for locomotive cylinders were referred back to the committee.

Car Wheel Specifications.

The proposed special specifications for cast iron car wheels precipitated a lively discussion. Mr. Sherman suggested that the weights of wheels be limited to three classes, as follows: Six hundred-pound wheel for cars 60,000 pounds capacity and less; 650-pound wheel for 80,000 pound car, and 700-pound wheel for 100,000 pound car. The present classification gives wheels of 590, 650 and 705 pounds for 60,000, 70,000 and 100,000 pound cars. Dr. Dudley said that he places the greatest importance on the tape sizes of the wheels, inasmuch as the smaller the tape size the deeper the chill, while the larger the tape size, the smaller the chill and the more liable the wheel is able to withstand the tests. Mr. Sherman stated that the specifications state that the wheels should be selected for testing at random, while the inspectors usually take the extremes of the tape sizes for their tests. Limiting the tape sizes to three he said was hardly fair, inasmuch as they oftentimes run up to four and five. Dr. Dudley continued the discussion, stating that the railroads cannot take chances on car wheels and will not do so. With the heavy equipment now in use, the question arises whether the cast iron wheel will continue to answer the purpose. He said that he believed it would with certain modifications. With reference to tape sizes, he said that it is assumed that the wheels of the same tape size are all of one quality, and if a wheel fails, it is fair to assume that all the other wheels of the same tape size in the lot offered will fail.

The question of the drop test and the number of blows to be delivered was next taken up, and it was suggested that the weight of the drop be increased, the drop for the 600-pound wheel to weigh 140 pounds; 650-pound wheel, 175-pound drop, and the 700-pound wheel to have a 200-pound drop. With regard to the thermal test, it was suggested that for the 600-pound wheel the limits was to be 2 minutes, for 650-pound 2½ minutes, and for the 700-pound wheel 3 minutes. On the question of annealing it was stated that reannealed wheels withstand the thermal test better than wheels only annealed once. With reference to the annealing of wheels it was stated that the top wheel does not stand as good tests as those further down in the pit. Mr. Sherman said that he has overcome this difficulty to a large extent by having a cast iron cover on his pit, and covering it with hot sand to a depth of about six inches. The specifications with the suggestions were referred back to the committee for further action.

In the specifications for malleable castings it was suggested that the tensile strength be reduced to 40,000 pounds, and the speed of testing was criticised in the gray iron specifications. Both were referred back to the committee.

At the meeting of the cement section standard specifications were presented, but the results of tests of steel-concrete by A.

N. Talbot, F. E. Turneaure and Edgar Marburg were not ready for presentation.

William J. Keep's paper on Cast Iron, which has previously appeared, was not read, and a discussion of the paper by Thomas D. West was announced but not read. George H. Hull read a paper on "Pig Iron Feasts and Famines," in which the pig iron warrant system was suggested as a preventive of famines and feasts in the iron trade in the future.

FOURTH SESSION.

Standard Specifications for Iron and Steel.

William R. Webster, chairman of Committee A on standard specifications for iron and steel, presented his report at the Friday afternoon session. He said that a circular letter addressed to the members of this committee on the general question of the desirability of considering various modifications in the standard specifications proposed by committees of other societies, and in part adopted by these societies. The report continues as follows:

"The replies to this circular inquiry, though in the main favorable to the proposition, were largely non-committal. Certain members thought it undignified to introduce any modifications in the present specifications so soon after their adoption; others considered it undesirable to make any change until the specifications had been subjected to a longer trial; while again others expressed their conviction that it was imperative to introduce certain modifications in order to bring the specifications into line with their conception of the best current practice.

"Inasmuch as the modifications of specifications adopted as standard by the society as a whole involved an important question of general policy, and since the sentiment of the committee on this point was evidently greatly divided, the chairman thought it expedient to submit this question to the judgment of the society. If it be the sense of the meeting that the time has come to consider a revision of the specifications, especially with reference to such modifications as have been proposed or adopted by other representative bodies, a meeting of Committee A will be called at an early date to take action in accordance therewith.

"In that connection it is interesting to call attention to the movement that has been recently initiated in England, on similar lines and under conditions which are in part distinctly more favorable than those under which we are laboring, namely: (1) In that the work is under the joint auspices of the five leading technical societies, viz.: The Institution of Civil Engineers, the Institution of Mechanical Engineers, the institution of Naval Architects, the Iron and Steel Institute, the Institution of Electrical Engineers. The personnel of the various committees is made up of representatives of these five societies, as well as officers of the War Office and Admiralty Department. Representation on these committees, has been accorded also to numerous engineering, scientific and trade associations, to the International Association for Testing Materials as well as to the leading manufacturing and consuming interests. (2) In that the British government is lending financial support to the work in the form of a grant of £3,000. The Indian government having appropriated an additional sum of £,1000. The committees have further the direct financial support of the five above named engineering societies.

"The scope of the field which this committee on engineering standards proposes to cover may be judged from the following list of committees and sub-committees:

"1. Sections used in shipbuilding (11 members). (A) Sub-committee on tests for iron and steel material used in the construction of ships and their machinery (23 members).

"2. Bridges and general building construction (12 members).

"3. Railway rolling stock underframes (13 members).

"4. Locomotives (28 members). (A) Sub-committee on component parts and tires (14 members). (B) Sub-committee on steel plates (7 members). (C) Sub-committee on tires, axles and springs (6 members). (D) Sub-committee on copper and its alloys (6 members).

"5. Rails (22 members). (A) Section on railway rails (11 members). (B) Section on tramway rails (4 members).

"6. Electrical plant (22 members). (A) Sub-committee on generators, transformers and motors (13 members). (B) Sub-committee on temperatures of insulation materials (5 members). (C) Sub-committee on cables and conduits (11 members). (D) Sub-committee on telegraphs and telephones (7 members).

"7. Screw threads and limit gauges (26 members). (A) Sub-committee on screw threads (26 members). (B) Sub-committee on limit gauges (17 members).

"8. Pipe flanges (12 members).

"9. Cement (17 members).

"Three of the above named committees have considered independently the question of standard sections for rolled iron and steel, and have held joint meetings and have agreed upon standard sections which have been adopted and published.

"It is perhaps not too much to expect that eventually on the completion of the reports of the English committee, the results of their work and our own may be harmonized, provided that the American specifications have the indorsement in their present or modified form of the leading kindred societies, so that they may be recognized as truly representative American specifications."

Specifications for Axles and Forgings.

H. V. Wille made a comparison of the specifications for axles and forgings, proposed by the committees of the American Railway Master Mechanics' Association, and the American Society of Mechanical Engineers, with the standard specifications adopted by the American Society for Testing Materials as follows:

"The American Society for Testing Materials has been strongly urging the adoption of standard American specifications. This result can only be obtained by co-operating with other societies. But after formulating its specifications the American Society has done very little for the furtherance of this purpose. The American Society of Mechanical Engineers and the Master Mechanics' Association are considering the question of forgings, but each committee has worked independently of the other with the results that we now have more specifications than ever. In an attempt to harmonize these differences the chairman of the Master Mechanics' Association made an effort to secure a joint meeting of the chairmen of the committees on forgings of the different societies, and this meeting was attended by Prof. Spangler, of the American Society of Mechanical Engineers, Messrs. Vauclain and Pomeroy, of the Master Mechanics' Association, and by the writer.

"It was conceded to be desirable that the American Society of Mechanical Engineers and the American Society for Testing Materials' specifications for high steel and the Master Mechanics' specifications for steel axles and locomotive forgings should correspond, inasmuch as the synopses of specifications attached to the American Society for Testing Materials' specifications for forgings show that outside of the United States Government the railroads and builders of locomotives are the most extensive users of this grade of steel.

"In order to place the makers of basic and acid steel upon an equal footing, it is also desirable either to raise the limit for phosphorus without any reference to the method of making the steel or give the basic makers a lower limit and the acid makers a higher one. The standard American practice, however, appears to be to place the limit on phosphorus and sulphur at about .05 without regard to the method by which the steel is made. The following statement shows the difference in the proposed specifications of the different societies:

	M. E. High	M. M. D. A.	M. M. Forg.	T. M. Forg.	T. M. Steel axles	Compromise suggested for Steel D. A. and Loco. Forg. and high Steel annealed
Phosphorus	.04	.05	.05	.04	.06	.05
Sulphur	.04	.05	.05	.04	.06	.05
Manganese	.....	.60	.60	.....	.....	.60
Tensile Strength	80000	80000	80000	80000	80000	80000
Elongation %	18.	20.	20.	22.	18.	20.
Reduction of Area	35	35	35	35	.....	25
Bending 1" x ½" test	180° over 1" dia.	None	None	180° over 1" dia.	.....	180° over 1" dia.

"This compromise would require the following changes in the various specifications: American Society of Mechanical Engineers.—Phosphorus and sulphur raised from .04 to .05; a limitation of .60 on the manganese; elongation raised from

18 to 20 percent in 2-inch section; reduction of area reduced from 35 to 25 percent. Master Mechanics' Association.—Reduction of area reduced from 35 to 25 percent, and the addition of a bending test. American Society for Testing Materials.—Steel axles. Phosphorus and sulphur reduced from .06 to .05; manganese limited to .60; elongation raised from 18 percent to 20 percent; reduction of area of 25 percent and a bending test specified. Forgings. Phosphorus and sulphur raised from .04 to .05; limitation of manganese to .60; elongation reduced from 22 percent to 20 percent and reduction of area from 35 to 25 percent.

"The manganese is limited because experience indicated that steel is less liable to fail by fatigue when the tensile strength is secured by additions of carbon rather than by manganese."

The action taken on the report of Committee A has been previously referred to, and an effort will be made to secure standard specifications on iron and steel that will represent American practice. A paper on "Specifications for Air-Brake Hose" was read by Max H. Wickhorst.

FIFTH SESSION.

The annual smoker was held at the Traymore on Friday evening, considerable business being down for this occasion, however. Gaetano Lanza reviewed the status of testing in the United States at some length, while William Campbell's paper on "Structure of Alloys" was illustrated by stereopticon views. F. A. Kummer, read a paper on the "Effects of Preservative Treatment on the Strength of Timber," followed by an able paper on the "Early History of 60,000-pound Structural Steel," by S. T. Wagner.

Early Practice in Testing.

In discussing Mr. Lanza's paper, William Metcalf indulged in a few reminiscences on testing in this country. He said that he was glad to know that Mr. Lanza gave the manufacturer some credit for having made tests in the early days and mentioned Major Wade and Captain Rodman as being among the first to make tests of iron. One of the tests made was of a cold rolled bar, and it was found that its specific gravity was lower than that of the hot rolled bar, which until proved by tests was not believed to be the case. Continuing, he said that fifty years ago no mill or engine had a masonry foundation, but were erected on logs, a practice which proved immensely profitable to the foundries engaged in replacing broken parts. Nor were there any civil or mechanical engineers practicing their profession except in the employ of some concern, the professional engineer of today being entirely unknown. The great development of engineering he credited to Sir Henry Bessemer, the cheapening of steel resulting in its greatly increased demand, with the result that concerns were compelled to call in engineers into consultation. During the Civil War he made 3,000 guns, none of which failed on the proving grounds or in service, showing what durable castings were made even at so early a day, and he added that in his 30 years of mill experience he rarely ever got as good a casting as was made in the early days.

In discussing Mr. Wagner's paper on the early history of 60,000-pound structural steel, Mr. Kent said that in 1879 and in the early eighties while he was in charge of the open-hearth plant of Shoenberger & Co., Pittsburg, they made boiler steel of 60,000 pounds tensile strength, and it was also being made at that time by Park Bros. and Hussey, Howe & Co., Pittsburg, and the Otis Steel Co. However, he said that they made no effort to roll structural sections.

SIXTH SESSION.

"The Commercial Testing of Sheet Steel for Commercial Purposes," by C. E. Skinner, of the Westinghouse Electric & Mfg. Co., of Pittsburg, was the first paper presented at the session on Saturday morning. H. E. Diller, of the Western Electric Co., presented a paper on the "Permeability of Cast Steel." The aging of sheet steel was one of the questions Mr. Skinner was asked to comment further upon. He said that it was known that this was the case, for ten or twelve years, but he could advance no working theory. He said that he had seen changes in sheet steel subjected to a heat about the boiling point of water, in ten days, but the cause of this change he was unable to explain.

Mr. Metcalf in discussing this paper said that the physical conditions also had much to do with the quality of the sheet. About ten years ago one of his friends was having trouble with sheets for electrical purposes, and by exercising more care in the rolling the sheets were greatly improved. In following up this matter he suggested that the physical properties be carefully examined into.

Brittleness in Structural Steel.

J. P. Snow presented a paper on "A Proposed Test for Detecting Brittleness in Structural Steel," followed by a paper on "Tests for Detecting Brittle Steel," by William R. Webster, which we give below:

"All engineers aim to avoid the use of brittle steel in their structures. They have very properly specified such chemical limits as will eliminate this trouble in steel from segregation. This course has been followed in this country for years and does not need further comment.

"Most of the steel now made will meet all the requirements of the specifications in general use, with a large margin to spare. This has given a false sense of security, and too many chances are being taken. In some cases the cold bending tests have been omitted on boiler steel and the material accepted on the results of tension tests alone. Hundreds of boilers are made every year under these conditions. Every now and then a plate fails in shop work, and samples taken from such plates will generally not bend flat cold, or anywhere near it. We have no means of learning how many other brittle plates which do not fail in shop work are put in boilers. The failures generally occur in thick material, and in most cases the ordinary cold bending test as called for in our specifications would have detected the brittleness.

"There are other cases where axles, rails, etc., are put in service without any physical tests whatever being made. This is directly contrary to the specifications adopted by this society and the opinions expressed in the discussions at our meetings.

"Some think that heat always has a softening effect on steel, as in annealing, and that the hotter the steel is finished in rolling or forging, the softer it will be. On the contrary, under such conditions, heat has a hardening effect and is one cause of brittle steel. The laboratory experiments on the effect of heat have been confirmed by the results obtained from large masses of steel. Steel finished too hot in rolling or forging will have a large grain and will fail under the ordinary cold bending and drop tests. The engineer cannot ignore this any more than he could ignore the effect of chemical composition. Under these conditions is it not proper and just that he demand of the maker some assurance that his steel is finished at the proper temperature and not at any old temperature? It is, of course, preferable to prevent, if possible, steel being made brittle, than to take the chances of its being detected after it has been made brittle.

"This society took a decided step in the right direction in specifying that cold bends shall be made on each heat of steel in the condition it leaves the rolls. This has been more clearly defined by the Committee on Iron and Steel Structures of the American Railway Engineering and Maintenance of Way Association, in their specifications, as follows: 'Full-sized material for eye-bars and other material one inch thick and over, tested as rolled, shall bend cold 180 degrees around a pin the diameter of which is equal to twice the thickness of the bar without fracture on outside of bend.' This requirement has been put in general use and necessitates the bars being finished in rolling at a lower temperature, and large eye-bars are now made which meet the requirements of full-sized test, very much better than formerly.

"All of our present specifications make concessions in the requirements for the heavy material, and it is a question if we have not gone too far in that direction, as it assumes that such heavy material will, of necessity, be finished at a much higher temperature than the lighter material. It also does not induce the maker to improve his methods. The necessary improvement in the present methods which would be required to finish the heavy material at the proper temperature would decrease output and increase cost of such heavy material. Is the consumer willing to pay more for a better material? If so, the maker would, no doubt, meet him half way.

"It will not be necessary to adopt any of the more elaborate

tests which have been suggested to detect brittle steel, if the finishing temperature is properly controlled and wide cold bends made of full thickness of material rolled. But in the case of forgings, castings and other very heavy material, annealing will have to be more generally introduced."

Both papers were discussed at length. The nicked bending test as suggested by Mr. Snow was believed to be an excellent one, but manufacturers present were of the opinion that the addition of more tests in mills would greatly interfere with the output. It was stated that in a plant where an order was being rolled by a number of mills it would require an inspector at every stand of rolls to carry out the tests as suggested, and a half dozen inspectors would be required to do the work. If the inspection can be carried out in a reasonable manner, however, it was believed that the test would be a good one, for the reason that the tensile test does not always show the brittleness in the steel. It was admitted by one of the manufacturers that there is some steel on the market that is not what it should be, although the tensile tests show up very fine. It was further stated that while Mr. Snow's test might be a good one, it assumes too much intelligence on the part of the average inspectors, the manufacturers being at the mercy of young men oftentimes working under ironclad rules, whose say-so costs the manufacturer large sums of money. Less steel is now being spoiled on account of the heat treatment, the manufacturers now working out that problem very carefully.

William Metcalf told of his experience with young West Point graduates who were sent on to his foundry during the Civil War to make tests of shells. On one occasion he was throwing out shells that the young officer had passed, and the inspector requested that his work be not interfered with. He said that his orders were peremptory with regard to passing shells, and Mr. Metcalf said that his orders were even more peremptory against allowing any shells to be passed that were defective.

The report of Committee G on the magnetic testing of iron and steel was not presented.

SEVENTH SESSION.

The closing session was held on Saturday afternoon. W. K. Hatt presented a paper on "Tensile Impact Tests of Steel," and Paul Kreutzpointner read a paper on "The Desirability of a Uniform Commercial Speed for Testing." His request to have a committee appointed to prepare such specifications was referred to the executive committee. The proposals of Albert Sauveur's paper regarding changes in the nomenclature of iron and steel and the work that has been done on this line in Germany did not receive great encouragement. Committee H reported on "Standard Tests for Road Materials," the report being presented by L. W. Page. H. V. Wille read a paper on "Staybolt Iron and Machine for Making Vibratory Tests," and the convention adjourned after the description of a new chuck for holding short test pieces by T. D. Lynch. P. H. Dudley's paper on "Bending Moments in Rails" was read by title.

Members and Guests in Attendance.

The following is a list of those in attendance at the meeting:

C. B. Dudley, chemist Pennsylvania Railroad Co., Altoona, Pa.
Edgar Marburg, professor of civil engineering, University of Pennsylvania, Philadelphia.
H. I. Budd, State Commissioner of Public Roads, Mt. Holly, N. J.
Emil Swensson, consulting engineer, Pittsburg.
R. A. Carter, Monongahela Iron & Steel Mfg. Co., Pittsburg.
Charles F. McKenna, chemist, New York.
Albert Sauveur, editor *Iron and Steel Magazine*, Cambridge, Mass.
F. W. Davis Jr., New York.
G. M. Goodspad, McKeesport, Pa.
J. R. Worcester, consulting engineer, Boston.
S. E. Thompson, Newton Highlands, Mass.
Harry H. Quimby, assistant engineer of bridges, Philadelphia.
R. S. Greenman, assistant State engineer, Albany, N. Y.
W. A. Aiken, inspector of material, Rapid Transit Railroad Commission, New York.
J. W. Schaub, Chicago.
J. E. Greiner, engineer of bridges and buildings, B. & O. Railroad, Baltimore.
Wm. R. Webster, civil engineer, Philadelphia.
M. H. Wickhorst, chemist, C. B. & Q. Ry., Aurora, Ill.
Robert Job, chemist, Philadelphia & Reading Railroad, Reading, Pa.
Allen P. Ford, Chicago.
Leon S. Moisseiff, assistant engineer to Commissioner of Bridges, New York.
F. O. Bunnell, engineer of tests, C. R. I. & P. Ry., Chicago.
Malcolm McNaughton, Joseph Dixon Crucible Co., Jersey City, N. J.
E. C. Holton, chemist, Sherwin-Williams Co., Cleveand, O.
C. C. Schneider, vice president American Bridge Co., Philadelphia.
O. Hoff, New York.
C. L. Huston, vice president Lukens Iron & Steel Co., Coatesville, Pa.
G. W. Thompson, chemist, National Lead Co., New York.
George R. Bentley, Central Iron & Steel Co., Harrisburg, Pa.
Charles Major, American Bridge Co., Pencoyd, Pa.
Wm. Jordan, Jr., University of Pennsylvania, Philadelphia.
A. O. Backert, *The Iron Trade Review*, Pittsburg.
S. S. Voorhees, engineer of tests, Treasury Department, Washington, D. C.
Geo. C. Warner, Sullivan Machinery Co., Claremont, N. H.
A. P. Hume, Pencoyd, Pa.
Joseph Royal, inspecting engineer, Philadelphia.
C. S. Churchill, chief engineer, Norfolk & Western Ry., Roanoke, Va.
P. H. Conradson, Franklin, Pa.
Frank P. Cheesman, National Paint Works, Williamsport, Pa.
C. Richard, Long Island City, N. Y.
C. N. Forrest, chemist and inspector, Long Island Railroad, Long Island City, N. Y.
A. S. Cushman, Washington, D. C.
W. P. Taylor, Philadelphia.
L. W. Page, chief of road material laboratory, Dept. of Agriculture, Washington, D. C.
T. D. Lynch, Westinghouse Electric & Mfg. Co., Pittsburg.
Henry M. Loomis, chemist, International Acheson Graphite Co., Niagara Falls.
W. C. DuComb, Jr., engineer of tests, Philadelphia.
Fred W. Schultz, *Iron Age*, New York.
R. P. Miller, chief engineer, Bureau of Buildings, New York.
John M. Goodell, *Engineering Record*, New York.
A. N. Stewart, New York.
I. H. Woolson, New York.
W. M. Johnson, Pittsburg.
F. E. Schmitt, New York.
N. A. Hallett, cement inspector, Boston.
W. O. Dunbar, assistant engineer, Pennsylvania Railroad, Altoona, Pa.
A. L. Johnson, chief engineer, Expanded Metal Fireproofing Co., St. Louis.
W. M. Saunders, chemist, Providence, R. I.
C. W. Sherman, general manager, Pennsylvania Malleable Co., Pittsburg.
R. K. Meade, chemist, Northampton Portland Cement Co., Easton, Pa.
H. J. Laman.
John C. Robinson, St. Louis Portland Cement Co., St. Louis.
H. E. Diller, Western Electric Co., Chicago.
R. C. Davison, *Railroad Gazette*, New York.
E. McLean, Altoona, Pa.
J. J. Shuman, Jones & Laughlin Steel Co., Pittsburg.
John McLeod, Carnegie Steel Co., Pittsburg.
P. E. Carhart, Illinois Steel Co., Chicago.
A. Bonzano, Bonzano Rail Joint Co., Philadelphia.
R. W. Lesley, American Cement Co., Philadelphia.
J. F. Walker, chemist, Protectus Co., Bridgeport, Pa.
G. E. Thackray, Cambria Steel Co., Johnstown, Pa.
C. H. Clifton, Philadelphia Municipal Testing Laboratory, Philadelphia.
H. H. Campbell, general manager, Pennsylvania Steel Co., Steelton, Pa.
G. Lindenthal, consulting engineer, New York.
F. H. Lewis, Fordwick, Pa.
C. Matcham, manager Lehigh Portland Cement Co., Allentown, Pa.
J. G. Brown, Philadelphia.
E. M. Hagar, Cement Department, Illinois Steel Co., Chicago.
C. W. Boynton, cement inspector, B. & O. Railroad, Chicago.
N. M. Edwards, Montreal, Can.
Clinton R. Stewart, Cambria Steel Co., Johnstown, Pa.
J. C. Ramage, supt. of tests, Southern Railway, Alexandria, Va.
Louis Cheeseman, Sr., Alexandria, Va.
A. H. Sabin, chemist, New York.
A. N. Johnson, highway engineer, Maryland Geological Survey, Baltimore.
A. W. Dow, inspector of asphalts and cements, Washington, D. C.
William Metcalf, Braeburn Steel Co., Pittsburg.
E. S. Larned, United Building Materials Co., Boston.
James Christie, American Bridge Co., Philadelphia.
W. W. Lemen, Roanoke, Va.
Millard E. e Barcus, Philadelphia.
W. A. Bostwick, Carnegie Steel Co., Pittsburg.
Samuel T. Wagner, city engineer, Philadelphia.
Geo. S. Webster, chief engineer, Bureau of Surveys, Philadelphia.
A. N. Talbot, University of Illinois, Urbana, Ill.
G. H. Clamer, Ajax Metal Co., Philadelphia.
Richard Moldenke, secretary American Foundrymen's Association, Watchung, N. J.
W. K. Hatt, Purdue University, Lafayette, Ind.
E. R. Maurer.
J. Jenkins, Montclair, N. J.
A. A. Stevenson, Standard Steel Works, Burnham, Pa.
E. W. Lazell, Philadelphia.
John B. Lober, Vulcanite Portland Cement Co., Philadelphia.
Richard L. Humphrey, Buckhorn Portland Cement Co., Philadelphia.

William Kent, dean of L. C. Smith College of Applied Science, Syracuse, N. Y.
W. R. Dunn.
Gaetano Lanza, Massachusetts Institute of Technology, Boston.
Henry Fay, Massachusetts Institute of Technology, Boston.
Stephen W. Baldwin, Pennsylvania Steel Co., New York.
Charles M. Mills, Rapid Transit Co., Philadelphia.
H. Taggart, engineer of tests, Lukens Iron & Steel Co., Coatesville, Pa.
H. E. Smith, chemist, L. S. & M. S. Ry. Co., Collinwood, O.
C. S. Reeves, Philadelphia.
George H. Hull, American Pig Iron Storage Warrant Co., New York.
H. M. Peirson, Radnor, Pa.
C. W. Roepper, Philadelphia.
F. E. Turneaure, University of Wisconsin, Madison, Wis.
Charles C. Pilgrim, Newark, N. J.
W. H. Harding, Philadelphia.
H. F. Moore, mechanical engineer, Riehle Bros. Testing Machine Co., Philadelphia.
A. W. Murkell, Wheeling, W. Va.
Walter L. Webb, Philadelphia.
Joseph W. Hunter, State Highway Commissioner, Jenkintown, Pa.
George Freeman, Jr., Freeport, La.
C. D. Mathews, Camden, N. J.
Thomas D. West, Thomas D. West Foundry Co., Sharpsville, Pa.
C. E. Skinner, Westinghouse Electric & Mfg. Co., Pittsburg.
C. R. Gardiner, Pittsburg.
Nathan H. Davis, Philadelphia.
H. A. LaChicotte, engineer, Manhattan Bridge, New York.
E. F. Kenney, Philadelphia.
Geo. B. Hartley, Syracuse, N. Y.
Henry J. Hartley, Philadelphia.
Walter Wood, R. D. Wood Co., Philadelphia.
W. M. Parks, U. S. Navy.
J. A. Kinkead, engineer of tests, American Locomotive Co., Schenectady, N. Y.
George P. Hemstreet, Hastings Pavement Co., Hastings-On-Hudson, N. Y.
B. F. Fackenthal Jr., Thomas Iron Co., Easton, Pa.
J. A. Colby, inspecting engineer, Philadelphia.
Tinius Olsen, Tinius Olsen & Co., Philadelphia.
A. Falkenau, Falkenau-Sinclair Co., Philadelphia.
Charles F. Gowen, engineer, New Croton Dam., Ossining, N. Y.
William Campbell, Columbia University, New York.
Herman von Schaub, St. Louis.
William A. Polk, Patterson-Sargent Co., New York.
J. E. Ober, Schenectady, N. Y.
James Berrall, civil engineer, Washington, D. C.
Paul Kreutzpointner, Pennsylvania Railroad, Altoona, Pa.
H. V. Wille, engineer of tests, Baldwin Locomotive Works, Philadelphia.

The Copper Industry's Annual.

For the past four years there has been published at the center of the copper mining industry of Lake Superior a compilation of copper information. Starting in 1901 as a mere addition to the annual report of the State mineral commissioner of Michigan it has developed into a pretentious volume of 775 pages, every one of which contains information of interest and importance to students of the copper mining industry. This book has gained in circulation, as it has in size and completeness of information, and it is now one of the most widely distributed mineral annuals printed. It is compiled and published by Horace J. Stevens, of Houghton, Mich., who has made the metal a study for years and is a recognized authority on copper. The chief feature of the volume is the 600 pages devoted to the copper mining companies of the world, listing and giving information as to no less than 3,311 separate mines and mining companies. To some of these are devoted as many as 10 to 12 pages of closely printed information. The labor required for the compilation of this single chapter is monumental. There are statistics of the industry to the close of 1903, which are fully a year later figures than are given in government publications. Copper is also treated historically, geologically, chemically, mineralogically and metallurgically, most of the chapters devoted to these topics being full and quite complete. Copper deposits are treated, also, by the world's political divisions. The volume closes with more than 100 pages of advertisements of persons, firms and corporations connected with the industry.

The new proprietors of the National Steam Pump Works at Upper Sandusky, O., have reorganized as follows: President, R. J. Main; vice president, George W. Main; secretary, David Main; treasurer, J. M. Main; directors, R. J. Main, D. Main, V. Reynolds and J. G. Main.

LAKE SUPERIOR IRON MINES.

The coarse crushing side of the Oliver Iron Mining Co.'s big ore crushing plant at Escanaba has been completed and crushing commences at once. The fine crushing plant, which was to have been built in connection with the rest of the works, will not be completed yet, and some changes in details of arrangement are under consideration. The coarse crushing side uses only one machine, a No. 9 Gates gyratory, and all ore taken to it is elevated from the crushing pit on a belt conveyor rising at an angle of 18 degrees to shipping pockets that discharge by gravity into cars for delivery to the shipping pockets at the harbor dock, a mile away. The crusher is set in a pit, and space is reserved for a second machine that will do the preliminary work for the rolls of the fine crushing plant. It is expected that the complete works, with both coarse and fine crushing sides, will cost about $150,000. The second half will be installed another season in all probability. The present side will have capacity for about 250,000 tons a year and 250 h. p. is required to drive it. A second crushing plant will probably be erected later at Two Harbors, Minn., for hard ores that may be received there. There are now in Minnesota ore crushers at Tower mines, for the hard Soudan ores of the Oliver company, and at Biwabik, for hard ores mined at the mine of that name, belonging to the Biwabik Mining Co.

Every large mine of the United States Steel Corporation in the Lake region, that is expected to be a shipper of importance this year, is forwarding ore in greater or less quantity. This change in the situation has been made with wonderful rapidity, for a week ago there were but very few shipping. In the case of outside and independent mines there is not quite so marked an improvement, though most of them are now busy. But in no case are mines shipping at full schedule, for boats have not begun to arrive rapidly enough for that. In a week or two the pace will be very similar to that at the height of the season of 1903.

A private report just made on the amount of power installed, nearly all of which is in use, at mines of the two Minnesota ranges shows a total of 48,000 h. p. This is 18,000 h. p. in excess of about 16 months ago. It includes not only hoisting engines, but steam shovels in stripping pits and at stockpiles, dinkies and standard gauge locomotives used about mines, compressors, pumps, lighting and other electric plants, in short all power used in mining and handling ore about the mines. Of this stripping contractors on the Mesabi range alone have about 5,500 h. p., used for operating 21 shovels and attendant locomotives, mining companies have 24 shovels used chiefly for stripping and 42 for loading stockpiles and from open pit mines. There are five shovels additional used for loading at Vermillion range mines. There are in all at the various Minnesota mines no less than 92 steam shovels, ranging in size from 40 to 110 tons. The standard size seems to be about 65 tons. The larger mines and groups of mines under similar management have been installing large and well equipped machine shops. Several firms of stripping contractors have done the same. The last mine to undertake this addition is the Biwabik, which is to erect machine and boiler shops with 12,000 sq. ft. floor space, covered by a traveling crane and equipped with the best machines.

The American Sheet & Tin Plate Co. has sent a crew of explorers from Duluth to North Carolina, where it has properties to be explored. Mr. Walter J. Croze, geologist with the Oliver Iron Mining Co., at Duluth, has gone in charge of the new work.

The tramming system at Chapin mine, Menominee range, will be changed from chain to electric and work has commenced. For this week hoisting will be inactive at the mine on this account.

After a good deal of cross-hauling and talking the county board of Marquette county, Mich., has cut the assessment of the various J. J. Hill companies located there but holding property in the Mesabi range of Minnesota, from $1,000,000 to $50,000, reducing their taxes from $20,000 to $1,000. This was done on account of the threat by the companies that they would withdraw and relocate in West Virginia.

The American Iron & Steel Co. has declared a dividend of 1¼ percent on its preferred stock, payable July 1.

Alloy Steels.*

BY WM. METCALF.

The term alloy steels is used chiefly to distinguish steels containing influencing quantities of metals other than iron from the ordinary steel of commerce known as carbon steel, in which iron and carbon are the influencing elements for use, other elements being considered more as impurities than as useful ingredients. There are three kinds of carbon steel of universal use: crucible, Bessemer and open hearth. Their discussion does not belong properly to our subject; but it may be observed that they contain small quantities of phosphorus, sulphur, silicon, and manganese, as well as oxygen, nitrogen and hydrogen. Copper and arsenic are present sometimes but not so generally or in such quantity as to require the careful analyses that are necessary for other ingredients.

Certain small percentages of silicon, and of manganese are often regarded as useful for special purposes but not in such quantities as to justify their giving any specific name to the steel. From time to time we have had put upon the market silicon steel, phosphorus steel, chrome steel, aluminum steel, none of which have won any permanent place in commerce. Of permanent alloy steels we have nickel steel, manganese steel, self-hardening or air-hardening steel, and the latest, the new variety called high speed steel.

Nickel Steel.

Nickel steel containing comparatively small percentages of nickel is used chiefly for structural purposes, giving increased strength and toughness. It has been applied mostly to Armor plates and gun parts, and lately it is being tested largely in rails to determine whether the increase in durability in difficult places will justify the greater cost over ordinary Bessemer or open hearth rails.

Manganese Steel.

Hadfield's manganese steel is unique—hard, tough, non-magnetic, non-hardening by quenching, non-annealable by any known method, practically unmachinable. It stands by itself; there is nothing to compare it to, nor to test it by. It is finding large use for a number of special purposes.

Self-Hardening, or Air-Hardening Steel.

This steel derives its name from the fact that when it is heated to an orange color and allowed to cool slowly in the air it becomes exceedingly hard. Some years ago it was known generally as Mushet steel from the fact that its first development was due to the distinguished metallurgist whose name it bore. The usual composition of this steel is about 2 to 3% manganese, 4 to 6% tungsten, and carbon high.

The distinctive, persistent hardness of manganese steel indicates that it is manganese that gives this steel its so-called self-hardening property. This was confirmed many years ago by Langley, who found that steel high on carbon, containing about 4% tungsten and minute quantities of manganese had no self-hardening property, and that the same steel re-melted so as to contain 3% mn. became an excellent self-hardening steel. Langley next showed by his beautiful emery wheel test, that tungsten is the element that acts as a mordant to hold the carbon in solution at a high temperature, giving this steel its most valuable property, that of remaining hard at a comparatively high temperature, so that a tool made of it could be used for cutting metals at a high speed; the tool continuing to do its work at a temperature caused by the enormous friction of the high speed, that would soften completely and render useless the best carbon steel tool that could be made. This very useful variety of steel has a large place in the markets, being used for many purposes where its peculiar properties give it great value. It is being rapidly overshadowed, however, by the latest and most surprising steel of all known as

High Speed Steel.

Air-hardening steel as a rule is not tough. That is to say, if it is made tough it will not be very hard; the edge of a tool will flow. And when it is so hard that it will not flow, then it is so brittle that it will crumble easily, and this limits its usefulness. A few years ago at the Bethlehem Steel Works some person, whether he was a blunderer or a genius history does not say, revolutionized the whole machine business. Either by design or accident he heated a tool made of air hardening steel until it was nearly melted, and according to the traditions and teachings of the ages the tool was ruined utterly. Again, either by accident or design this ruined tool was put into service, and to the amazement of everybody it did an unheard-of amount of work. This led to further experiments and tests, and the Taylor-White process was developed. This process consisted in heating a tool excessively hot and cooling it by successive stages, producing a tool that would cut at enormous speed for metal work and take off chips that developed enough heat to blue them. The process was patented and therefore it is not necessary to go into a long explanation here, especially as it has been superseded.

The process seems to have been uncertain; that is to say, when a tool was handled just right it produced results that were wonderful, and when the manipulations were not exactly right the results were nil. The potentialities were so great that nearly all of the leading steel makers in the world attacked the problem with the result that the present high-speed steels are in no sense of the word air-hardening. Mn. has been reduced from 3 to 4% to 0.30% to traces; tungsten has been increased to 10 to 20% instead of the usual 4 to 6% and the carbon is generally less than 1. There are about fifty different brands on the market, and of course each one is the best. Perhaps the analysis of two of the leading brands will be interesting:

Tungsten	9.99	18.48
Chr.	2.83	2.90
C.	.60	.79
P.	.010	not determined.
S.	.010	not determined.
Si.	trace	not determined.
Mn.	trace	.33

Another contains:

Molybdenum	9.65
Chromium	0.00
C.	.66
P.	.016
Si.	.046
Mn.	.22

In one sense it is chaos; all traditions as to heating are completely reversed, and no one really knows what is the best. One brand is famous for its excellence in one kind of work; another in another kind; no one yet seeming to cover all of the ground. One thing is certain: the machine business is revolutionized. These tools have crowded ordinary lathes, planers, drills, etc., away beyond their capacity; machine builders are remodeling their machines to meet the new conditions, and many of the users are throwing out their old machinery for the new, or else remodeling and strengthening what they have.

There are many records published of the work done by this steel, giving speed per minute, feed, depth of cut, etc., so that it is not necessary to repeat them here. A few illustrations of what can be done may be interesting.

Performances of High Speed Steel.

In one case a couple of steel cast bed plates about four feet wide and nine feet long were to be planed. There was nominally a half inch to come off, but the unevenness of the casting made the cut about one inch in places. The surface was hard and gritty from the sand of the mold. Several tools were tried, each one going about half an inch and then having to be reground. Next, one tool cut about two inches without grinding. Finally, a tool was tried that had turned up a large, rusty, cast iron pulley without grinding, and it cut clear across the bed plates and was still in good condition for further work. It is clear that the cost per pound of that tool cut no figure.

Another party had a great many castings to thread. With dies made of the very best carbon steel, he could at moderate speed thread from 2,000 to 3,000 pieces without grinding. With dies made of high speed steel, and with his machine running as fast as he can drive it, he threads from 20,000 to 30,000 pieces without grinding.

Another party turns many pieces of hard brasses, and found it difficult to get a tool that would cut them at all until he tried the right high-speed steel and made a tool that would

*Read at the Atlantic City meeting (June, 1904) of the American Society for Testing Materials.

cut all day without grinding, running his lathes at the highest speed he could get.

The same party bores many cast iron cylinders, and with tools made of steel that would not cut his brass, he bores eight to ten cylinders without regrinding, and at a speed so great that the cylinders come out too hot to be handled with the naked hand. He tried in his cylinders the steel that cut his brass so well, and it would bore only two to four cylinders without grinding.

Another party drills 2 3/8-inch holes 7 inches deep in soft steel forgings, drilling a hole in about three minutes. The same steel will not make a good threading die for the same forgings and for this he uses another brand. Neither of these steels will make a good lathe tool for turning these forgings, and for this work he uses a third brand. All of these brands upon analysis would come within the limits of the analyses given above.

From all of this two things are clear: one is that there has been a marvelous, a revolutionary, advance in the machining of metals. The other is that steel makers have met the demand remarkably. It is also clear that we do not know yet where we are and there is much to be learned by everybody. The best methods of hardening may not have been found. It seems that for very high speed work it is necessary to fairly melt the point of the tool and quench it in a strong air blast and then grind to shape. This would not do for threading dies, milling cutters, etc., for the heat would destroy the tools. Such tools are finished from annealed bars. This high speed steel can be annealed as nicely as carbon steel, differing in this respect from air-hardening steel. The finished tools are heated in a lead bath to 1,800° to 2,000° and are quenched quickly in ordinary tempering oil which must be kept cool by a coil containing circulating cold water. They are then tempered in a bath of heavy oil heated to about 450°. The tools come out bright and clean and do their work wonderfully well.

The steel maker has the most to learn. He must find out why there is such a great difference in the work the steel will do, when there is no little difference in composition. He must find the composition or mixture that will come nearest to meeting all of the requirements. He has at command now ferro-manganese, ferro-silicon, ferro-chromium, ferro-tungsten, ferro-molybdenum, ferro-vanadium and ferro-titanium. These alloys are all expensive except the first two, costing from 60 cents to $12 a pound. Therefore the present prices of high speed steel, which to some people seem to be of the fancy order, are really not excessive.

As far as we know at present the steel users have not succeeded in making tools that are satisfactory for finishing, and for this purpose they resort to tools of carbon steel after having done the rougher, heavier work with high speed steel. This difficulty may be overcome by proper methods of hardening and tempering, or the steel makers may find a composition that will make a tool that is as good for finishing as for roughing. The successful production of the above named alloys marks a great advance in metallurgy, and now that a demand has sprung up it is certain that the supply will follow, with certainty and uniformity of composition and reductions of cost.

The making and utilizing of steel containing practically only carbon and iron, with some modifications made by the use of small quantities of mn., si., tungsten and nickel, have occupied the best minds in the manufacturing and engineering world for many years. The last half of the nineteenth century saw most wonderful developments produced by the inventions of Bessemer and Siemens, aided by the skill and energy of the brightest engineering minds. At the close of the century it was customary to "point with pride" and to assume that so much had been done and so much was known, that there was no room for more revolutionary changes, and that the coming generation had only to tag along, utilizing these great advances with ease and comfort to themselves, and with blessings upon their predecessors.

Now, in the first five years of the twentieth century, we older men find ourselves standing on our heads once more. A revolution has come already; and we can look forward to a splendid opening for the exercise of the best energy and thought of the succeeding generation.

We enjoyed the struggle and the gains of our time and we can rejoice with the younger men in the prospect of the great triumphs that are to come for them. Clearly there is still plenty to do, and plenty to learn, and in the doing of them there will be great pleasure.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Columbia Steel Co., Chicago, has been incorporated with a capital of $200,000 for the general manufacture of iron and steel. The incorporators are: Charles C. Johnston, Frederic Evon Ammon and Major McGregor.

The Lee, Cowan & Bowen Co., Syracuse, N. Y., has been incorporated with a capital of $50,000. The company will continue its business of making wagon springs and will increase the size of the present plant.

The Lafayette Stove Foundry Co., Lafayette, Ind., has been organized with stock subscriptions for $32,000, although the authorized capital is only $30,000. The following board of directors were elected: Jeff. Crouch, J. D. Bartlett, F. S. Moore, George E. Kendall and Evan Shelby. The company has secured a building and will at once begin the installation of machinery and the manufacture of stoves. It is expected that stoves will be ready for the market next fall.

The Rockford Engine Works, Rockford, Ill., has been incorporated with a capital of $50,000 to manufacture engines, machinery and tools. The incorporators are: George Cormack, Fred C. Zumdahl and W. Maynard Kirby.

The Steelar Mfg. Co., Chicago, has been incorporated with a capital of $5,000 to manufacture machinery, implements and devices. The incorporators are: Charles R. Young, Willis E. Thorne and Carl J. Florsheim.

The Chosko Bridge Co., of Muskogee and Haskell, I. T., has been incorporated with a capital of $60,000, of which $25,000 subscribed. The incorporators are: S. H. Criswell, A. A. Kinney and W. J. Criswell.

The Salem Iron Foundry Co., of Salem, Mass., has been incorporated with a capital of $15,000. The officers are: President and treasurer, William S. McIntire, Salem, Mass.; clerk, Frank W. Delano, Salem.

The McHardy-Randolph Steel Motor Boat Co., Detroit, Mich., has been incorporated with a capital of $100,000, of which $51,000 is paid in. The incorporators are: James A. McHardy, Boyce Randolph and David E. Heineman.

The Findlay Foundry & Machine Co., Findlay, O., recently incorporated, will soon be in the market for machinery with which to equip its plant. The company has a building 100 x 200 ft., in part two stories, and expects to do a general machine and foundry business. Its specialties in the beginning will be the Field steam pump, Field's pumping power, pumping jack and rig irons and oil well supplies. The company will have entire control of the former business of the Van Buren, Heck & Marvin Co., with the exception of the Buckeye traction ditcher, which that company will move to its new factory.

James Deitrick, managing director of the United States & Nicaragua Co., which is to build 500 miles of railroad in Nicaragua, and a director of the American Mining Co., recently incorporated with a capital of $15,000,000, to take over the mining end of concessions secured from the Nicaraguan government, is now in New York to make purchases of material, equipment, etc. He may be found at the Fifth Avenue Hotel or at the office of H. A. Rogers, 19 John street. The American Mining Co.'s president is Thomas B. Riter, of the Riter-Conley Mfg. Co. of Pittsburg. The vice president is M. K. Salsburg, Pittsburg. Secretary is W. M. Rees, of the John M. Rees Mfg. Co., Pittsburg. Directors are: Charles H. Myers, James Deitrick, E. H. Cooledge, George Hyde Lee, E. S. Platt and F. C. Lee.

The Toledo Metal Fixture Co., Toledo, O., has been incorporated with a capital of $10,000. The incorporators are: John Milens, C. K. Fankhauser, E. E. Perry, L. J. Hacker and James S. Emery.

The Cassady-Fairbank Mfg. Co., Chicago, has been incorporated with a capital of $150,000. The incorporators are: Stuart C. Shepard, Charles J. Burgess and Herbert M. Weston.

The Ostrander Steam Rotary Engine Co. has been incorporated at Yonkers, N. Y. Capital $10,000, and will manufacture rotary engines. Incorporators are: A. I. Ostrander, Yonkers;

James Mallory, Wilmington, Del., and Jno. F. Cogan, New York City.

The Syracuse Bridge Co., Syracuse, N. Y., has been incorporated with a capital of $30,000. The directors are: O. H. Mallory, O. M. Wood and B. C. Andrews, Syracuse.

The H. Schminke Co., of Evansville, Ind., has been incorporated with a capital of $5,000 to manufacture galvanized iron, tins, stoves and other similar wares and goods. The directors are: H. Schminke, Frederick Leotzerich and George F. Lamey.

The Secor Engine Company, Waterford, N. Y., has been incorporated; capital, $500,000, for the manufacture of engines. The incorporators are: H. A. Shipman, J. F. Lambias and G. Isakson, all of New York City.

The Syracuse Bridge Co. has been incorporated at Syracuse, N. Y., capitalized at $30,000. The incorporators are: A. H. Mallory and O. M. Wood, Syracuse, and G. B. Siekman, Newark Valley, N. Y.

Fires and Accidents:—

The plant of the Williamsport Valve & Hydrant Co., Williamsport, Pa., was completely destroyed by fire June 8. Loss $60,000. Insurance about $30,000.

The plant of the Kinne Mfg. Co., manufacturer of boilers and sheet metal articles, Minneapolis, was almost completely destroyed by fire June 9. The fire was due to carelessness with matches on the part of small boys. The loss to the Kinne Co. was $25,000, with $17.000 insurance. Loss on the building was $8,000.

The foundry of Dunbar & Sons, of Woodstock, N. B., was damaged by fire on June 7. The principal damage was to the patterns. The loss is only partly covered by insurance.

New Construction:—

A new erecting shop, 30 x 50 ft., two stories, is being built by A. E. Jones, Union City, Conn., to manufacture special machinery. He proposes later to manufacture a line of machine shop tools.

The Buckeye Gasoline Engine & Foundry Co., Joliet, Ill., recently incorporated with a capital of $50,000, will erect three buildings; two 50 x 80 ft., and the third, 50 x 210 ft. One building will be used as a storehouse, one for a foundry and the third for manufacturing purposes.

The Weir Stove Co., Taunton, Mass., will build an addition to its molding department 60 x 110 ft. About twenty additional molders will be employed.

The Portland Iron & Wire Works, Portland, Ore., are rebuilding their plant recently destroyed by fire. The burned wooden buildings will be replaced with larger brick structures. Temporary quarters are being occupied and orders are being filled.

The Kansas City Hay Press Co., Kansas City, Mo., has completed its new foundry building, 100 x 210 ft., and equipped it with the latest improved machinery. Compressed air is used in operating the traveling cranes, chipping hammers, etc. The company is remodeling its old foundry building and will use it as a machine shop. An office building will also be erected.

The Colorado Iron Works Co., Denver, has decided to issue $200,000 worth of bonds and will make extensive additions to its plant.

The Missouri Pacific Railroad has let the contract for the laying of the foundations for the new buildings of its shops at Sedalia, Mo. Work will be commenced at once.

The Grand Trunk railway has purchased 182 acres on the outskirts of Battle Creek, Mich., and will remove its locomotive shops from Port Huron to that place. A new station costing $75,000 has also been promised by the railroad to the Business Men's Association, of Battle Creek. Five years have been allowed by the agreement with the association to complete the work of removing the shops.

Andrew Redin, and Cordelius and Peter Eckstrom will erect a new machine shop this summer on Seventh street, Rockford, Ill.

The Reliable Gas Machine & Mfg. Co., Davenport, Ia., will erect a machine shop 130 x 22 ft., two stories.

The Chattanooga Roofing & Foundry Co., Chattanooga, Tenn., has just completed another addition to its plant, consisting of a two-story brick building 75 x 150 ft., to be occupied by the blacksmith and pattern shops. This is the second addition within the past two years, and the two greatly facilitate the output of the plant.

The Woodward Iron Co. has let the contract for 300 additional coke ovens at its plant at Woodward, Ala., to Minor Bros., of Birmingham. The ovens are to be built at once.

Morris & Lewis, of Rock Island, Ill., will erect a brake-shoe plant near the new shops of the Rock Island railroad at Moline, Ill. The plant will include a foundry and machine shop.

McNeal & Co., Joplin, Mo., have begun work on their new machine shop and foundry, which will be two stories, 100 x 120 ft.

Considerable building is being done by manufacturing companies at York, Pa. One large shop is being built, two destroyed by fire are being rebuilt, two are being enlarged and others are making alterations and improvements. The new shop of the York Foundry & Machine Co. is being rapidly pushed to completion. The brick work for the first story is almost completed. The Broomell, Schmidt & Steacy Co. is building a large boiler and machine shop as an addition to its present plant. The York Mfg. Co. is erecting several buildings on newly acquired property, including a large pattern shop.

The Toledo Machine & Tool Co., Toledo, O., has let the contract for an addition 40 x 70 ft., which will be used as a forge shop.

The Kelly Axe Mfg. Co., of Alexandria, Ind., is preparing for the erection of its new plant at Charleston, W. Va. The city has donated 53 acres. The new plant will have a capacity of 12,000 axes per day.

Citizens of New Albany, Miss., have purchased a tract of land to be donated to the Mobile, Jackson & Kansas City railroad to secure the general shops of that company, which will represent an investment of about $250,000. The company has finished its line from Pontotoc to New Albany and trains will be running between these two towns within three weeks.

The Columbia Heating Co., Belvidere, Ill., will erect a foundry 250 x 80 ft. It is expected that next spring the structure will be extended, making it 80 x 420 ft. Considerable new machinery is to be installed.

The five Allerton brothers, of Benton Harbor, Mich., have organized the Allerton Bros. Pattern & Model Works and have erected a plant in which patterns will be made. The plant is well equipped.

The Buckridge Pump Co.'s plant, Wichita, Kan., which has been under the management of A. T. Buckridge for the past seventeen years, has been sold to a new company. The company is composed of A. H. Webb, president; D. F. Sholly, of Denver, vice president and treasurer; and W. L. Kellogg, of Fort Scott, secretary. The building now in use is too small and a large addition will be built and new machinery installed.

Excellent progress is being made in the buildings of the Wenzelmann Mfg. Co., formerly of Streator, Ill., which recently decided to move to Galesburg. Two buildings are 40 x 200 ft. and one 60 x 200 ft. The company manufactures a device for unloading wagons, also sickle sharpeners and other farm machinery.

Cobb & Drew, Rock Falls, Ill., manufacturers of bolts and nuts, are building a large addition to their plant. The cost will be about $40,000.

The corner stone of the Litchfield, Ill., plant of the American Radiator Co. was laid June 9 with appropriate ceremonies. One of the features of the event was a civic parade. The officials of the American Radiator Co. went from Chicago to attend the ceremonies.

Extensive improvements are being made to the main building of the Wheeling Mold & Foundry Co., Wheeling, W. Va. The enlargement is necessary in order to turn out the heavy castings for the Pennsylvania tunnel in accordance with the contract recently taken.

The Chicago Great Western railroad, because of the rapid expansion of its system, has decided against the policy of centralization of its shops, which was originally planned. The principal shops of the system will be located at Oelwein, Ia., as they now are, but a great deal of repair work will be done at other points. Probably three shops will be erected; one at Des Moines and another at Clarion or Somers, Ia.; the first to take care of repair work on the St. Joseph division and the other on the Omaha and Sioux City lines. The third shop

will be located either at Hayfield or Red Wing to take care of the business of the Minnesota lines. The shops will not be large and will employ from 50 to 70 men.

The Indiana Foundry & Machine Co., South Bend, Ind., which recently increased its capital from $10,880 to $25,000, is planning to largely increase its business. These plans have not yet been matured, but in general they include the enlarging of the brass department and the building of a large storage house for patterns which up to this time have been kept in a part of the main foundry. The company is not yet ready to state what equipment will be needed.

The Ridgeway Foundry Co., Ridgeway, Pa., has erected a building 40 x 80 ft., for the manufacture of iron, brass and bronze castings. The company began business on May 1 and has been very prosperous.

The Reliable Gas Machine & Mfg. Co., Davenport, Ia., has purchased two acres at Bettendorf, Ia., and will build a large plant. It is proposed to erect a series of eight buildings. The contract for the erection of the first building has been let as well as for the office building. The company has been very successful with its automatic gas machine and its prospects are apparently bright.

The Pittsburg Stove & Range Co., Pittsburg, after three years of negotiating has completed plans for the consolidation of all its plants, with the exception of the New Castle plant, into one single establishment. The plant will be located in Allegheny, the new site adjoining the company's Anshutz-Bradberry stove foundry. A new building to be used for assembling and warehouse purposes, seven stories high and 60 x 200 feet will be erected, while an addition to the foundry 80 x 100 feet will be erected. This additional foundry capacity will give a molding floor covering 26,000 square feet. On completion of these additions the existing plants in Allegheny will be dismantled. Emil Swensson, engineer, Frick building, Pittsburg, prepared the plans for the additions and the new building.

The Pittsburg Freight Tunnel Co. was granted a Pennsylvania charter last week. The capitalization is only nominal. The new company will endeavor to secure a charter for an underground freight delivery road similar to the underground system now in operation in Chicago.

The Kabley Foundry Co., of Worcester, Mass., is planning to erect a new foundry building this summer to replace their present wooden structure.

Arrangements are being made by W. S. Gleim & Sons, of Lancaster, Pa., for the erection of a foundry 100 by 125 feet.

General Industrial Notes:—

The Minneapolis Iron Store Co., of Minneapolis, has been expanding its manufacturing business and now turns out yearly 3,000 sets of bob sleds and 3,000 harrows, in addition to large quantities of ironed goods and implement specialties. The company was formed in 1888, succeeding Charles Betcher, who in turn succeeded Harrison & Knight, who were among the pioneer jobbers of Minneapolis. Two years ago the Minneapolis Iron Store Co. bought out the iron and steel department of Janney, Semple, Hill & Co., and a year ago bought out the Gregg-Seager Co., who were competitors in heavy hardware and blacksmiths' and wagonmakers' tools and supplies. The officers of the company are: H. S. Gregg, president and general manager; S. L. Sewall, treasurer, and J. S. Proctor, secretary and sales manager.

R. J. Main, of Swayzee, Ind.; George and David Main, of Cairo, Ill., and J. M. Main, of Upper Sandusky, O., have purchased the interests of L. C. Cole in the National Steam Pump Co., of Upper Sandusky, and the company has been reorganized with the following officers: President, R. J. Main; vice president, G. M. Main; secretary, David Main Jr.; treasurer, J. M. Main.

The Minneapolis Steel & Machinery Co. has been awarded the contract for the superstructure of the new Thirty-second avenue bridge in Minneapolis. The contract price is $47,774, which is $3,500 less than the former offer of the same company and more than $10,000 less than the original estimate of the city engineer.

The first steel was made at the open hearth plant of the Central Iron & Steel Co. at Harrisburg, Pa., June 9. The steel made was basic, and the analysis proved that it was of excellent quality. The steel was taken from the first of the four 50-ton open-hearth furnaces to be completed by the company.

The Alabama Steel & Wire Co. has recently received large consignments of steel billets from Pittsburg at its Ensley plant. The entire plant is in operation.

The Zenith Furnace Co., Duluth, Minn., expects to have its coke oven plant in operation about July 1 and to put the furnace in operation about July 10. It is expected that the capacity of the furnace will be about 250 tons per day.

The Globe Iron Works, Chicago, recently incorporated with a capital of $100,000, fully subscribed, have bought the machinery, material, tools, fixtures, good will and all other appliances of the Globe Iron & Wire Works, which discontinues business. The officers of the company are: W. F. Frolichstein, president and treasurer, and H. R. Wilson, C. E., secretary. Mr. Frolichstein was formerly secretary and treasurer of the Globe Iron & Wire Works, and M. Wilson, secretary, was with the Noelke-Richards Iron Co., of Indianapolis, Ind. The company does not intend to build, but has acquired the lease of the present premises, 31-41 Indiana street, and the new business continues with all contracts as heretofore. The company is now working full force, is well supplied with contracts for future business, and with new equipment which it is now installing will add materially to its output.

The J. G. Brill Co., of Philadelphia, has obtained a contract for special trucks to be shipped to Spain for use on the electric traction system operated in Barcelona by La Industries Electrica. The same company has a contract for trucks and semi-convertible cars for shipment to Portugal.

Work on the erection of the new blast furnaces of the National Tube Co., McKeesport, Pa., is progressing rapidly and these stacks will be available before the first of the year.

The Thomas Iron Co. recently placed an order for two pairs of compound blowing engines for furnaces Nos. 1 and 3 at Hokendauqua, Pa. Each pair will be capable of blowing 40,000 cubic feet of air per minute under a pressure of 30 pounds. The contract was awarded to the Allis-Chalmers Co.

Geo. E. Guyer, receiver of the Eleanor Iron & Steel Co., whose plant is located at Irwin, Pa., last week commenced suit against John H., George and Eleanor Robinsteen on the charge of conspiracy to defraud. It is alleged that when the company was organized machinery said to be owned by Mrs. Robinsteen was purchased by the company, upon which a valuation of $6,000 was placed. For this machinery it is alleged that at various times Mrs. Robinsteen received stock of the company valued at $52,000. When the concern went into the hands of the receiver, it is alleged that investigation showed that the machinery was never owned by Mrs. Robinsteen, and that it was purchased from Wickes Bros., of Pittsburg, and the bill paid by the company.

The Shoenberger Bessemer plant of the American Steel & Wire Co., Pittsburg, was shut down this week, and the two blast furnaces at this plant have also been shut down. The Shenango Valley steel mill of the Carnegie Steel Co., New Castle, Pa., was also shut down, and will undoubtedly remain idle for a considerable period. This plant rolls tin bars for the two tin plate mills at New Castle, and as the tin mills will shut down on July 1 the steel plant will not resume until after the tin plate mills are again placed in operation.

At a meeting of the stockholders of the Youngstown Foundry & Machine Co. and the Youngstown Steel Casting Co., held at Youngstown, O., last week, it was decided to consolidate the two properties. Officers will be elected this week.

The rod, wire and wire nail departments of the American Steel & Wire Co., South Sharon, Pa., were shut down this week for an indefinite period. The blooming mill of the Carnegie Steel Co. at this place was also shut down and the open-hearth plant will shortly follow.

The Hyde Park and Saltsburg, Pa., sheet mills of the American Sheet & Tin Plate Co., are idle, owing to the dull conditions in the sheet trade.

The Bessemer plant of the Republic Iron & Steel Co., Youngstown, O., resumed operations again this week. The plant was off only one week. This plant has been alternately operative and idle for some time owing to the trade conditions.

The Star furnace, Jackson, O., has been blown out for relining, which will require about 60 days.

Is Your Boiler Feed Supply Bad?

Water may be as clear as crystal and yet full of the sulphates and carbonates of lime and magnesia, or other scale forming salts. You know the effects of these impurities in boilers—we know how to improve the quality of the water, no matter how bad, and we can provide you at a very moderate cost with apparatus that will prevent scale from forming in your boilers.

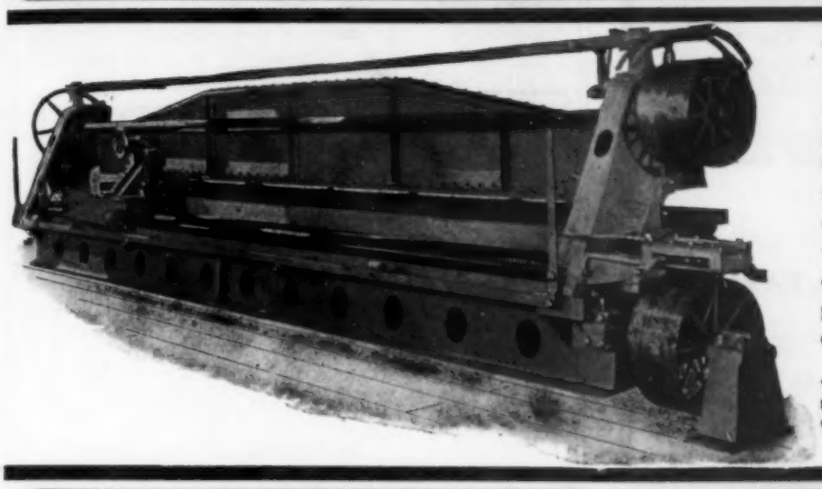
Ours is a reasonable proposition. We first set out to conserve and use all the pure water that you have. There are tons of it going to waste in almost every plant. For instance, there is the exhaust condensed in heating the boiler supply, the exhaust condensed in surface condensers, the exhaust condensed in heating and drying systems, the drips from exhaust heads, live steam separators, main headers, live steam coils, etc. Of course, all of the oil must be taken out of the exhaust steam, but we can do this effectively with our **Cochrane Oil Separators**, as those in present use are giving protection from oil to something like four million horse power of boilers.

Then to this pure condensation we add just enough fresh water to make up the supply for the boilers, treating this raw water chemically in a very simple and effective manner, so that the carbonates and sulphates are precipitated and corrosive acids neutralized.

Besides this, we take full advantage of the value of the exhaust steam for heating water, so that the boilers are fed with steam at the highest obtainable temperature.

HARRISON SAFETY BOILER WORKS, Clearfield and 17th Sts., Philadelphia, Pa.

Manufacturers of Cochrane Feed Water Heaters, Cochrane Steam and Oil Separators, and the Sorge-Cochrane Systems.



THIS ILLUSTRATION

shows our CLEVELAND PLATE PLANER No. 1

Method of clamping plate in this machine is by means of movable girder shown in illustration

The cutter head on this machine carries two tools, one tool cutting in each direction.

This machine may be equipped with jacks for clamping plate, if that method is preferred.

Machine shown above will plane 1″ plate entire length of table.

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Cleveland, O. U. S. A.

Our name guarantees quality

The Upson Nut Co.,

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HOT PRESSED NUTS

Accurate to size.
Finished in a very superior manner.
Extra strong.

Catalogue and prices on application.

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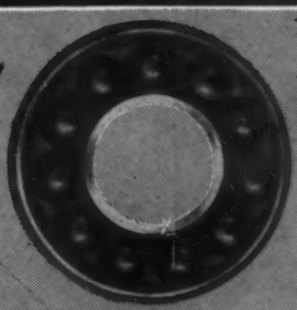

The test of quality lies in service. The best balls are known as "High Duty." We make them.

Something more than a micrometer is needed to distinguish good balls from bad ones.

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CLEVELAND BALL FACTORY—Cleveland

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Write for prices, stating capacity wanted

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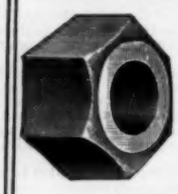
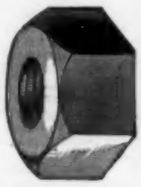
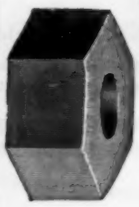


Made of double refined bar iron, well finished and every one true to size. That's one reason why you should try these nuts, and then—



NUTS



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AMERICAN STEEL HOOP COMPANY

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CINCINNATI:	Union Trust Building
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DENVER:	101, 102 Boston Building
DETROIT:	Union Trust Building
NEW YORK:	Empire Building
PHILADELPHIA:	Harrison Building
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WASHINGTON:	National Safe Deposit Building
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MANUFACTURERS OF

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(ANNUAL CAPACITY ABOUT 150,000 TONS)

ALSO EVERY VARIETY OF

Machine Bolts, Nuts, Washers, Turnbuckles, Lag Screws, Railway and Dock Spikes, Harvey Grip and other Railway Track Bolts. Boiler, Ship and Structural Rivets. Car Forgings and Rods and Irons for Bridges, Buildings, Etc., Etc.

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Manufacturers of Car Wheel, Malleable, Special Cylinder and Strong Foundry Irons.

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BOILER TUBES, Mild Steel and Charcoal Iron, for Stationary, Locomotive and Marine Work.

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